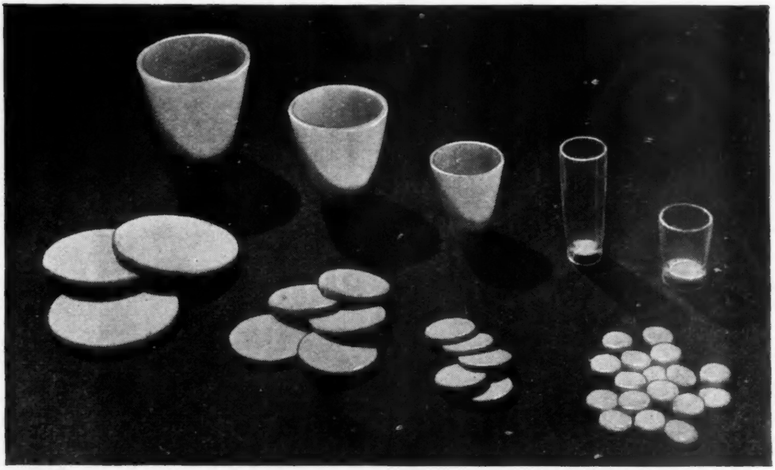
The Chemical Age

VOL LXIII 26 AUGUST 1950 No 1624



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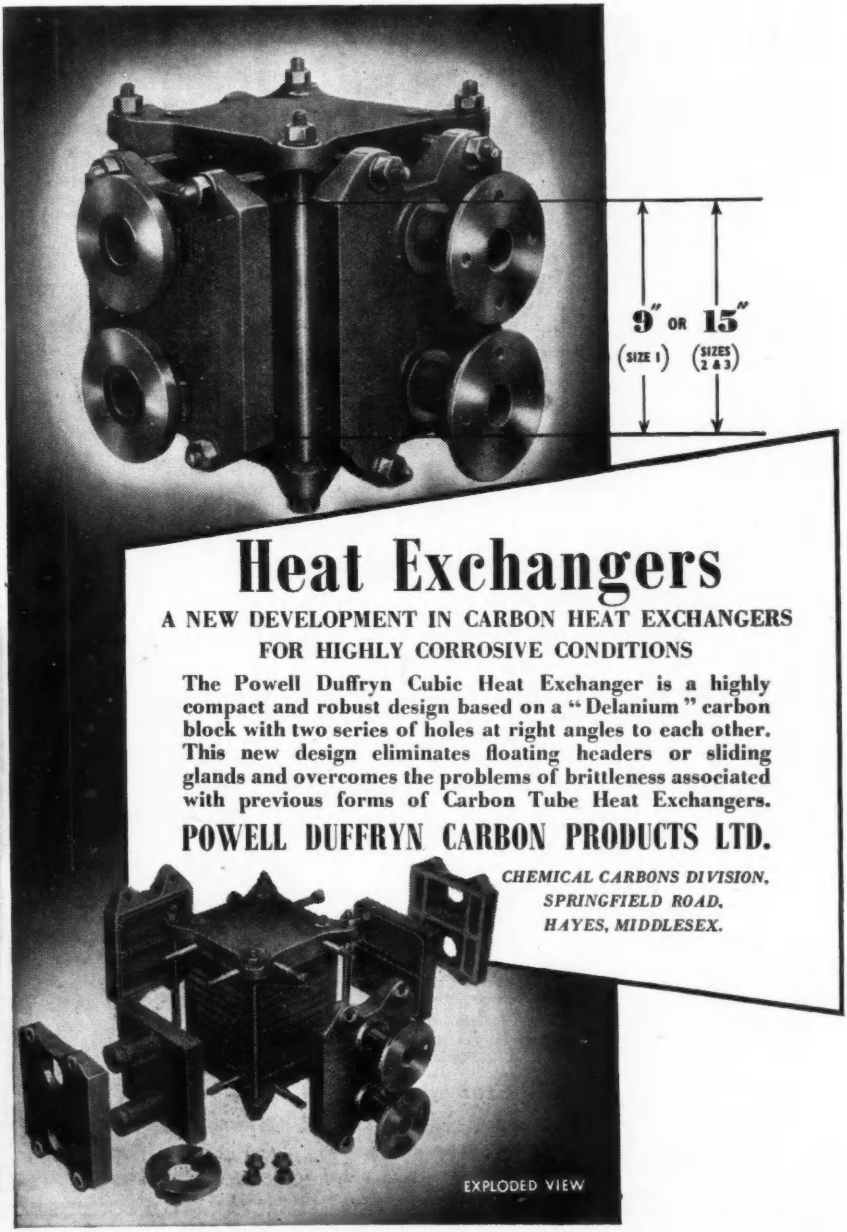
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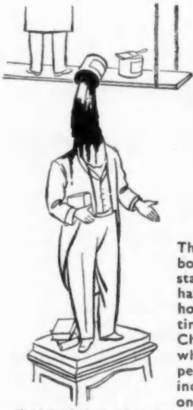
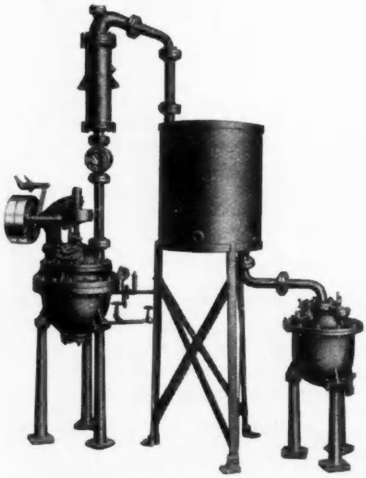




The
Chemical Age

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE 154 FLEET STREET LONDON E.C.4

Telegrams: ALLANGAS FLEET LONDON · *Telephone:* CENTRAL 3212 (26 lines)

Volume LXIII | 26 August 1950 | Number 1624

A Verdict on Antihistaminics

INCONCLUSIVE results are no novelty in the experience of those engaged in the fundamental branches of chemistry and not every research project by those concerned with applications produces an answer firmly affirming or negativing the theory. Chemists belonging to both schools may well be congratulating themselves—if they have stopped to think about it—on the degree of precision which characterises most of their investigations compared with the uncertainties which distinguish the work of medical scientists. That truism has been rendered more obvious than ever by the recent findings by the Medical Research Council on the ineffectiveness of some familiar antihistaminics as cold cures and by the unpredictable factors which had to be tolerated in the course of those researches.

The results, which the British Medical Journal (4676, 425-430) presents in detail, appear to controvert in the most decisive terms the effect of responsible research on the same subject, of which the most widely known was the work done in the U.S.A. (THE CHEMICAL AGE, 62, 576). The MRC has shown beyond doubt that, so far as clinical evidence gathered under carefully controlled conditions can establish, some of the most widely used antihistaminic preparations have no power at all to ward off the onset of the all too common cold and little or no capacity to reduce its duration once the attack has begun. That conclusion cannot be evaded in the light of evidence now presented. It is almost equally certain that thousands who have pinned their faith to one or other of the antihistaminics will continue to take them and that there will be just about as many " cures " as there were in the past.

The explanation of that apparent absurdity is perhaps supplied by what the MRC calls "psychogenic factors," which have their origin in the misty, ill-defined regions to which applied psychology and similar " sciences " belong. Chemists who deal only with inaminate material may be thankful they have not to take such unknown quantities into account. The complications to which they give rise were evidenced several times in the course of the MRC tests, carried out in one instance on 1550 people in different parts of the country, of whom a substantial number, the " controls " perversely reported the onset of symptoms associated with the effects of drugs they had not received. None of these things, however, discredits the fact that the results presented by D. M.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 30s.; single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Brewster of tests carried out in an American navy hospital (*U.S. Nav. Med. Bull.*, 1947, *47*)—which was the genesis of a good deal of confirmatory work and finally of sales of antihistaminics in the U.S.A. of the estimated value of about $100 million a year—are quite unreliable for general application. That will not come as a surprise to the American Medical Association, which had already concluded that the value of antihistaminic drugs as cold cures—of which thousands in America were convinced—could not be evaluated until "a scientifically acceptable study" had been performed.

The service which the MRC has rendered in this regard, which incidentally confirms some independent studies of the same kind in the U.S.A., was provided by two series of tests. In one, at the Common Cold Research Unit at Salisbury, volunteers were treated, before and after inoculation with cold virus, with Histantin (chlorocyclizine hydrochloride) or Phenergan (promethazine hydrochloride). An equal number of "controls" were given dummy tablets, and none of those concerned in these or the larger tests in various parts of the country knew who had received the antihistaminic and who had not. Preconceived ideas had no bearing on any of the results.

In the small-scale test at Salisbury the incidence of colds was precisely the same among those who received Histantin as those who took "control" tablets. In the Phenergan group the "controls" at one stage developed fewer colds than those who were treated. The test in which 1550 were concerned employed thonzylamine and showed that, apart from a very slight improvement at the end of one day's treatment, which was not apparent thereafter, the drug "has little if any value in the treatment of the common cold." At the end of a week those untreated reported 1.3 per cent more cures or improvements than did those who received the drug (71.4 per cent and 70.1 per cent).

Force is added to both these somewhat surprising verdicts on specific members of the antihistaminic group by another independent study (G. Lorriman and W. J. Martin) of Antistin. The results showed, broadly, that this drug had no more recognisable effect on the course of the common cold than any of the others.

Notes and Comments

Chemical Exports

THE total of British exports in July was £182,258,318, but this high level was not uniform over the whole field. Exports of chemicals, including drugs and dyestuffs, at £9,319,269, constituted a record. This compares with £6,434,589 in July last year. A record value was also achieved in the non-ferrous metals group, July exports here amounting to £7,366,809, against £4,539,070 in July, 1949. This substantial increase was largely due to the exceptional buying by the U.S.A. of tin from the Ministry of Supply's stock. The figure for July exports of unwrought tin (blocks, ingots, bars and slabs) was 3092 tons, against 311 tons in July last year, of a value of £1,962,985 (£178,609 in July, 1949). Of this total 2106 tons went to the U.S.A. (value £1,360,599) compared with 193 tons in July last year (value £111,625).

Progress of Science

THE announcement that *The Times* is to publish a second survey of the progress of science is one which merits the attention of all concerned with scientific topics. There is much to be said for this high endeavour on the part of a leading newspaper to present, in the form of a supplement, a group of articles dealing with the latest developments and research in the fields of pure and applied science. Written wherever possible in non-technical language these articles will fulfil several functions. For the specialist worker they provide an outline of work being carried out in fields far removed from his own and give perspective to his particular topic. The industrialist will be able to survey trends in the fields immediately relevant to his own. The student and the teacher can derive benefit from the articles which will allow them to correlate academic teachings with industrial and research techniques. To the layman, on the threshold of the subject, with much enthusiasm but little knowledge, the survey will be a symposium of fascinating scientific topics in which he should find much of interest. For everyone the supplement will delineate the directions in which scientists are progressing and give a measure of the extent to which the horizons of ignorance are being steadily pushed back.

Hidden Danger

THE panel which is now studying the toxic risks to man associated with the use of some agricultural chemicals will do well not to overlook the heightened danger presented by the fact that the effect of several of them is cumulative and there is at the outset no danger signal for the uninitiated. The force of that is emphasised by the data which a physician and a biochemist at Worcester (L. H. Milles and H. B. Salt) have collated of a specific case in which the organic phosphorus-compound Parathion was concerned. Their report (*The British Medical Journal*, 4676, 444) discloses in particular the suddenness and comparative violence with which the toxic effects manifest themselves after a period in which apparent immunity may well encourage the taking of risks. In this case, of a man of 46 whose work was to prepare a fairly dilute solution (2403/500 gall.) of 20 per cent Parathion for spray tankers for the hopfields, there seems to have been no foolhardy disregard of the risk. The apparent cause of the Worcester incident was the spilling of one drop of the 20 per cent insecticide on the forearm of the man, who washed it off 30 seconds later. Although a weal appeared within a few minutes there were no serious effects until nearly six hours after. Severe head and abdominal pains, vomiting and unconsciousness all occurred soon after that. Expert treatment (with heavy dosage of atropine sulphate) at the local hospital saved the situation, and very

probably the man's life. He was discharged five days later. The important fact in this case is that he had been doing this work for three weeks before the " cumulative " splash produced the unexpected retribution.

Scientific Jargon

THE multiplicity of scientific subjects, papers on which are planned to be read and discussed at the annual meetings of the British Association for the Advancement of Science due to commence next Wednesday (August 30), draws attention to the plea, made repeatedly and regularly through the ages, that such discourses should be as plainly worded as possible and should aim to explain and not to bewilder. The very titles of some of the papers this year, as, in fact, every year, leave a doubt in one's mind whether simplicity, for the benefit of visitors to the conference, is at all practicable. Authors and speakers need not, however, have any fear that their efforts will not compare favourably in this respect with those of their predecessors at British Association meetings. The *Birmingham Post* quotes one of the speakers, at a meeting of the association in Leeds some years ago, as having disemburdened himself of this: " As regards the fringe of the cilia of the œdogoniaceous swarmer, which is supposed to have been a feature of the flagellate ancestry of the stephanokontæ, cilial numbers other than the usual two or four are not unknown as motile volvocales." He was followed by another who observed: " The unbranched and the branched filamentous habits are met with in both classes, while the Cœnecytic botrydium is now clearly established as a siphoneous variant of the heterkontan analagous to protosiphon among the isokontæ."

Special Cements

BRITAIN'S much maligned climate used to save manufacturers many of the problems caused by extremes of temperature and humidity. Now that emphasis is on exports to all parts of the world that relatively care-free situation has ended. " Climatic " problems are arising where they did not exist before. Research workers have been called upon to solve such diverse problems as the rotting of leather in Burmese jungles, the warping of book covers in extreme conditions of relative humidity, and the breakdown of electrical equipment in the tropics. A specialised example of the way in which research is overcoming such difficulties is associated with the expanding export of optical instruments to the Far East. Manufacfacturers have had to provide, among other things, optical cements which are stable under extreme conditions of temperature and humidity. Canada balsam is still widely employed but becomes viscous on high temperatures and is too brittle at low temperatures for Arctic use. The search for a perfect substitute is, appropriately, the current responsibility of the British Scientific Instrument Research Association, which since 1918 has been actively concerned with the development of optical cements. Though a material capable of meeting all requirements has yet to be discovered, progress is indicated by the fact that nowadays optical instruments are operating efficiently in all parts of the world and under very exacting conditions. This, of course, is only one of the many directions in which science is assisting the export drive, but is certainly not of negligible importance in view of the growing value of instrument exports.

Acute Drug Shortage in Ceylon

THE continuing acute scarcity in Ceylon of drugs like penicillin, streptomycin and certain sulpha drugs has arisen largely as a result of the indents for these drugs not having been placed in time when available stocks were running low.

The Government Medical Stores asked for an indent of one million rupees worth of drugs to be placed with the Crown Agents in England four or five months ago, when it was realised that the existing stocks were inadequate to last till the end of the financial year.

Indents are stated to have been delayed until some weeks ago. Efforts have been made to get these drugs dispatched early.

RECORD CHEMICAL EXPORTS

July Totals Exceed £9 m.

THE chemical industry achieved a new record last month, the total value of exports, including drugs, dyes and colours, amounting to £9,319,269 compared with £6,434,589 in July last year, and £7,580,839 in the same month of 1948.

Notable increases were ammonium sulphate £871,908 (£532,367); the lead compounds: lead acetate, etc., £58,126 (£30,971) and tetra-ethyl lead £427,503 (£221,291); nearly all the sodium compounds again showed rises, and zinc oxides totalled £101,789 (£51,023).

Non-ferrous metals were also marked by a notable increase with a total of £7,366,809 against £4,539,070 in 1949.

EXPORTS

	July, 1950	July, 1949
	Gal.	Gal.
Cresylic acid	283,227	67,351
	Lb.	Lb.
Salicylic acid	102,548	85,078
Value of all other sorts of acid ...	£166,120	£98,336
	Tons	Ton
Sulphate of alumina	3,152	2,718
All other sorts of aluminium compounds	1,232	1,429
Ammonium sulphate	43,446	27,895
Ammonium nitrate	3,399	3,216
All other sorts of ammonium compounds	2,420	1,265
	Cwt.	Cwt.
Bleaching powder	20,344	19,429
All other bleaching materials ...	11,680	9,073
Collodion cotton	966	1,741
	Tons	Tons
Copper sulphate	4,337	4,402
	Cwt.	Cwt.
Disinfectants, insecticides, etc. ...	41,586	39,909
	Tons	Tons
Fertilisers	1,785	2,317
Value of gases (compressed, liquefied or solidified)	£31,495	£23,087
	Cwt.	Cwt.
Lead acetate, litharge, red lead, etc.	10,723	5,680
	Gal.	Gal.
Tetra-ethyl lead	206,408	152,142
	Tons	Tons
Magnesium compounds	886	904
	Cwt.	Cwt.
Nickel salts	4,978	5,990
Potassium compounds	7,661	5,325
	Tons	Tons
Salt	19,614	17,767
	Cwt.	Cwt.
Sodium carbonate	379,302	266,694
Caustic soda	256,421	215,571
Sodium silicate	22,852	24,001
Sodium sulphate	88,402	62,036
All other sodium compounds ...	79,948	61,707
	Gal.	Gal.
Tar, creosote oil, anthracene oil, etc.	3,797,694	3,011,191
	Tons	Tons
Zinc oxide	1,203	668
Total value of chemical manufactures (excluding drugs and dyestuffs)	£5,649,782	£3,560,644
Value of quinine and quinine salts	£26,677	£38,894
	Lb.	Lb.
Acetyl-salicylic acid	227,601	103,639
	100 International Units	100 International Units
Insulin	585,385	612,891
	Mega Units	Mega Units
Penicillin	1,204,243	564,271
Total value of drugs, medicines and preparations	£1,872,223	£1,158,384
Total value of dyes and dyestuffs	£691,319	£935,133
Total value of paints, pigments, colours, etc.	£1,105,945	£780,428
Total value of chemicals, drugs, dyes and colours	£9,319,269	£6,434,589
Plastic Materials:	Cwt.	Cwt.
Synthetic resins, solid and liquid, including adhesives ...	27,888	15,129
Moulding powders:	20,521	6,381
Sheet, rod, tube, film and foil—		
Laminated	2,652	1,777
Non-laminated		
Acrylic	2,852	1,724
Celluloid	977	545
All other sorts	4,719	2,143
Total value of all plastic materials	£755,896	£330,977
	Cwt.	Cwt.
Chemical glassware	1,530	738
Value	£64,428	£30,850
	Cwt.	Cwt.
Fans	3,658	3,942
Value	£92,247	£104,986
	Cwt.	Cwt.
Furnace plant	6,291	6,572
Value	£68,023	£84,100
	Cwt.	Cwt.
Gas and chemical machinery ...	21,994	27,813
Value	£252,315	£340,338
Scientific instruments: Optical		
Value	£73,338	£43,301
Thermometers, mercury, in glass etc.		
Value	£40,098	£23,686
	Cwt.	Cwt.
Air and gas compressors and exhausters	14,928	8,572
Value	£314,040	£191,165
	Cwt.	Cwt.
Non-Ferrous Metals:		
Aluminium and aluminium alloys	110,917	90,587
Value	£1,349,383	£1,042,608
	Lb.	Lb.
Bismuth metal (not including alloys)	37,710	14,866
Value	£24,536	£8,049
	Tons	Tons
Copper	4,797	9,157
Value	£1,051,795	£1,291,697
	Tons	Tons
Lead, unwrought, sheets, etc. ...	395	239
Value	£53,961	£30,061
	Cwt.	Cwt.
Nickel and manufactures thereof	14,422	20,993
Value	£332,859	£277,547
	Cwt.	Cwt.
Nickel alloys	7,645	8,308
Value	£179,172	£176,813
	Tons	Tons
Tin unwrought...	3,092	311
Value	£1,962,985	£178,609
	Lb.	Lb.
Tungsten (except ferro-tungsten)	17,977	15,901
Value	£13,340	£18,388
	Tons	Tons
Zinc	397	327
Value	£73,159	£35,522
Total value of group	£7,366,809	£4,539,070

FOOD PRESERVATION

Some Results of Recent Research

A GOOD example of the benefits which originate from fundamental research has been provided by its application to the basic properties of milk, producing as a result a big improvement in the keeping qualities of dried milk. The work was carried out at the Low Temperature Research Station of the DSIR, the Hannah Dairy Research Institute, and the National Institute for Research in Dairying. The story of this research will form part of the DSIR exhibit (Stand No. 76) at the British Food Fair at Olympia, London, August 29 to September 9).

The DSIR exhibit will demonstrate the two modern methods of preserving milk, by condensing and drying.

Milk Drying

Milk can be dried on hot rollers or by spraying in hot air after pre-condensation. The first method produces a satisfactory powder which keeps well but it has to be reconstituted with warm water. Hitherto it was the spray-dried, full-cream milk powder—which can be reconstituted easily in cold water—which had poor keeping qualities. As a result of the recent work this can now be kept in good condition for a year or more. Consequently, milk can be dried in the spring when it is plentiful and kept for use in the winter.

The commonest defect of the spray-dried powder, observes the DSIR in a review of this work, was a "tallowy" off-flavour due to the action on the fat in the milk of the air in the can in which the powder was packed. This can be overcome by replacing the air by an inert gas such as nitrogen. Another defect of this type of dried milk was the development of stale flavours, which was accompanied by some loss of its solubility.

Research work proved that this was due to a reaction between the protein and the sugar in the milk, the process being helped by too high a storage temperature and too much water in the milk powder. These disadvantages can be minimised by storing the milk at the lowest possible temperature, by drying as completely as possible at first and by ensuring that the milk powder cannot become damp during storage. Included in the DSIR exhibit will be a model of a gas-packing plant.

The gas storage of apples and other fruit will also be demonstrated on the DSIR stand. This method, although not new to growers, will probably be interesting to the general public, many of whom

(continued at foot of next column)

NEW PHOSPHORUS WORKS

Its Erection Opposed

STRONG local opposition to the erection of a phosphorus factory at Portishead, near Bristol (THE CHEMICAL AGE, 63, 9), has resulted in a month's adjournment of the Portishead Planning Committee's consideration of the project, and a petition is being circulated in the town.

The main objections are that the storage silos would be unsightly, that the processes involved would be odoriferous, that there would be light emission from furnace tapping, and that the disposal of 40,000 tons of slag per year would create traffic problems for an already congested road system.

The final decision whether to oppose the scheme rests, however, with the Bristol Corporation; the local Council's attitude can only be one of influence. It has already been pointed out that officials and local representatives have visited a factory at Oldbury where no objectionable air pollution was observed from the processes similar to those which would be operated from the proposed factory at Portishead. It is considered unlikely that any hardship would be felt by residents from this cause.

The economic benefits of the factory to the locality, it is thought, would be considerable. The Rural District Council for the surrounding area has already decided not to oppose the factory.

Manchester OCCA

ISSUING to its members an advance syllabus of its meetings to be held in the 1950/51 session, commencing on September 22, the Manchester section of the Oil and Colour Chemists' Association announces the appointment of Mr. E. Sutton, of the Anchor Chemical Co., Ltd., as membership secretary. The essay competition is to be continued, but it is proposed to award the prizes every two years and to double the value of the prizes, donated by the British Oil & Cake Mills, Ltd., and J. A. Kemp & Co., Ltd.

may not have been previously aware that by its use apples can be kept for nine months, which makes an English apple supply available all the year round. Models of a cold store and a gas store (using CO_2) will be on show, and advice on the construction and operation of the gas store will be available.

SCIENTIFIC INSTRUMENT EXPORTS

Widening Possibilities in the Canadian Market

THE value of Britain's exports of scientific instruments of all kinds to the markets of the world now reaches a considerable sum. It is not possible to give a very near annual figure, because the Board of Trade export returns do not show details of items correctly coming under this heading. It is known, however, that Britain's total exports of scientific instruments in 1949, including surveying, nautical, engineering and a variety of measuring instruments, represented a value of approximately £10 million.

Many of the scientific instruments of interest to the chemist and the chemistry research worker are lumped together in the official figures. Among the few which are shown anything like separately, " thermometers, mercury in glass instruments and meteorological instruments of all kinds " produced a total export value last year of £426,020. Optical instruments were valued at £921,742; medical and surgical instruments reached a value of £531,373.

The Scientific Instrument Manufacturers' Association of Great Britain (SIMA), in its monthly bulletin for July, gives some useful details of this country's scientific instrument exports in February, March and April this year, which it has compiled with the collaboration of the Engineering Industries Division of the Ministry of Supply. Total values are: February £886,400; March £1,065,800; April £881,500. We reprint, with acknowledgment, the following breakdown (in £'000s) of these totals:—

	1950 February	March	April
Chemical, medical and surgical glassware ...	38.1	55.1	39.8
Other types of glassware, including rod	29.4	28.0	19.2
Photographic and cinematograph instruments and appliances	236.3	291.0	216.3
Optical instruments ...	67.6	71.2	68.1
Engineering and industrial instruments	89.7	94.8	96.2
Nautical instruments and apparatus	36.5	41.4	26.8
Surveying instruments and apparatus	21.3	33.9	30.6
Thermometers, mercury-in-glass instruments and Meterological Instruments	36.0	42.7	34.6
All other types not elsewhere specified	162.3	209.8	171.2
Commercial instruments (electrical)	97.7	107.0	101.8
All other types of scientific electrical instruments ...	71.5	90.9	96.9

Compared with a monthly average of last year's figures, in such limited detail as is available, the totals given above for February, March and April this year indicate an upward trend. In fact, the situation as regards world prospects appears to be not without promise. A pointer is provided in the news letter of the SIMA president, Mr. J. E. C. Bailey, appearing in the association's current bulletin, in which he refers to the position of American-made scientific instruments as revealed to him on his recent visit to the annual convention in Chicago of the Scientific Apparatus Makers' Association of America.

U.S. Conditions

The outstanding feature of the American meetings, says Mr. Bailey, was undoubtedly the grave anxiety expressed by many members of the industry, particularly in the optical instrument sphere, over the competition being experienced in America from Japan and Germany. Naturally, he says, the possibility of further reductions in American tariffs—negotiations about which are due to take place in Torquay this September—gives causes for added anxiety to our American friends. It appeared that, in the case of binoculars, for example, American manufacture had been reduced to a very small figure. One manufacturer of optical glass had given up production altogether and others were considering following his example, purely on account of this intense Japanese and German competition.

Mr. Bailey says: " I was able to assure our American friends that it was not the policy of SIMA to seek a full-scale reduction of American tariffs, because we realised only too well that this would, in the main, give still further benefits to Germany and Japan, and that any reductions we might apply for would concern special instruments that were selling in the States now and would not cause any anxiety to the instrument industry in the U.S.A."

The SIMA president closes his news letter with an expression of opinion that the full-scale trend towards science is being maintained throughout the world generally, and that great opportunities are open to Britain's scientific instrument manufacturing industry in many countries overseas.

Referring to his visit to the Toronto

Trade Fair, Mr. Bailey says the display of British scientific instruments there was most impressive and reflected great credit on all concerned.

"We in the scientific instrument industry did not go to Canada under any misapprehension. For example, we realised that there was no large pent-up demand for instruments waiting to be filled. On the other hand, we wanted to give Canadian users an opportunity of seeing British scientific instruments and also to establish whether or not there was indeed a market for our products there. By common consent both points were fulfilled; Canadian scientists and users of instruments came in large numbers and expressed their deep satisfaction with the design and craftsmanship of the instruments. Prices were undoubtedly attractive, while it was established beyond all doubt that there was not only a market in Canada but an expanding market."

Prospects for British scientific instruments in the Canadian market are referred to in optimistic terms by Mr. A. G. Peacock, editor of the SIMA bulletin. He says: "Generally speaking the Canadian instrument buyer is most favourably disposed towards British equipment. He is not, however, affected by sentiment, knows what he wants in his equipment, and demands the right price. From even the briefest survey the possibilities of the Canadian market appear limitless. The full resources of the country have as yet been hardly touched and the exploitation of much of its wealth of minerals has not even started. The oil fields are expanding rapidly and much equipment of all kinds will be needed. In Nova Scotia iron ore reserves are only now beginning to be developed. Engineering and process industries of all types are expanding and sub-assembly or part manufacture are being replaced by primary design and production in Canada."

An idea of the present distribution of scientific instrument imports into Canada is given in the bulletin. (In making a comparison of Canada's share in Britain's world exports of any particular group of scientific instruments, the value of the Canadian \$ may be taken as 6s. 4d.). For example, in 1949 \$723,275 worth of thermometers were imported into Canada. Britain's share was \$48,395; the remainder, \$674,880, was from the U.S.A. X-ray apparatus totalled \$2,772,452; Britain's share of this was \$8073, the U.S.A. heading the figures with \$2,743,800. Optical instruments totalled \$3,127,143; of this, Britain exported \$177,643, France exported \$163,082, and the U.S.A. again claimed the bulk with \$2,668,465. In the case of X-ray apparatus, five other countries contributed to the imports into Canada with about \$4000 worth each. The optical instrument total was contributed to by 10 other countries besides Britain and the U.S.A. The figures for Germany and Japan were \$51,269 and \$42,976 respectively.

UNESCO Scheme for Scientific Education

SCIENTIFIC instruments, apparatus and collections intended for education or research will enjoy duty-free entry under a new international agreement sponsored by UNESCO to reduce barriers to world trade in educational, scientific and cultural materials. The text of the convention was recently approved by the 59 member states at the general conference of the organisation in Florence.

Exemption of duty will be dependent on the scientific instruments and apparatus being intended solely for educational or research purposes and destined for recognised educational or scientific institutions. Another provision is that materials of equal scientific value are not already being manufactured in the importing country.

UNESCO is circulating the convention to all its member states and to members of the United Nations. It will be open for signature shortly at Lake Success, New York, and will come into force following ratification by 10 countries. The United Kingdom Government has announced that it will submit the text to Parliament for ratification. Belgium, France, Luxembourg, the Netherlands and Switzerland are expected to take action for quick legislative approval.

The agreement on the importation of educational, scientific and cultural materials will also permit the free import of books, newspapers, periodicals, maps and charts. To aid their circulation further, contracting governments will grant licences and foreign exchange for publications consigned to public libraries.

Duties will also be lifted from educational, scientific or cultural films, filmstrips, newsreels and sound recordings.

This is the second international agreement sponsored by UNESCO. The first, designed to abolish duties, quotas, and licences hindering the movement of film recordings and other audio-visual aids to education, has now been signed by 18 countries.

INDUSTRIAL FINISHES

Modern Developments on View

THE importance of industrial finishes and their applications in a wide range of products will be demonstrated publicly for the first time at the Industrial Finishes Exhibition which will be opened by Sir Charles Goodeve, director of the Iron and Steel Research Association, at Earls Court, London, next Wednesday (August 30).

In the central technical exhibit the suitability of finishes for different purposes will be demonstrated. There are seven sections which show natural metal finishes, plated finishes, hot dipped coatings, sprayed metal finishes, vitreous enamel, organic finishes (lacquers and paints), and the anodising and dyeing of aluminium.

An entire demonstration unit more than 30 ft. long has been transferred to Earls Court by F. J. Ball & Co., Ltd., from its factory in Staffordshire. The unit will be complete with water-wash spray booth and compressor system and spray guns.

How infra-red gas-fired panels cut down time and cost in the drying processes of all finishes will be demonstrated by De La Rue & Co., Ltd. The panels will be grouped in a conveyorised tunnel and demonstrators will show how articles of all shapes and sizes can be dried on a simple line conveyor at the rate of 9,000 per hour.

Petroleum Chemicals

The important rôle now being played by the chemicals-from-petroleum industry in the production of surface finishes will be shown by Shell Chemicals, Ltd. Emphasis is, of course, given to products of particular interest to the surface coating industry, such as acetone, methyl ethyl ketone, methyl isobutyl ketone, diacetone alcohol and secondary butyl alcohol. Teepol is also shown to have its place in finishing by virtue of its use in pigment grinding, stabilising distempers, degreasing prior to coating, plating and acid pickling.

A new enamel treatment is being shown for the first time by the Lewis Berger group. Known as Polykem 666, this is an air-drying styrenated enamel used as a finishing treatment for hardware, sheet metal products, tools, etc.

Other exhibitors include: Bakelite, Ltd.; British Iron and Steel Federation; British Colour Council; British Standards Institution; Council of Industrial Design; Electrodepositors' Technical Society; Jenolite, Ltd.; Jenson and Nicholson, Ltd.;

(continued at foot of next column)

Metachemical Processes, Ltd.; the Board of Trade; Vitreous Enamellers' Association.

CHEMISTS AND THE PRESS

Aiding the Non-Scientific Reader

HOW the achievements of chemists and their services to the community can best be made known and explained to industry and the public has for some time been a matter of careful consideration by the Chemical Council.

A panel of chemists who are qualified both as writers and chemists and are willing to write an occasional article for the Press has been set up by the council in collaboration with the Royal Institute of Chemistry, which has agreed to act as centre of contact between the Press and the experts.

A Specialist Panel

Those who have given their names for inclusion on the panel are all highly qualified in chemistry and specialists in their own particular line. An ability to write for the non-scientific reader as well as their status as scientists has been considered an essential qualification.

The list of writers has been classified into six groups: the science of chemistry; chemistry in agriculture; chemistry in relation to foods and nutrition; chemistry in relation to medicine; chemistry and law; chemistry in industry.

The Chemical Council particularly wish that neither members of the panel nor the RIC should be asked to give information by telephone on current subjects. This method of information on scientific matters is considered liable to error or misinterpretation, and might prove detrimental to the development of closer relations between scientists and the public.

Articles prepared for the Press by scientific men should be treated in such a manner that the meaning and balance are not destroyed. Wherever possible it would be appreciated if a proof of the article could be submitted to the contributor.

The council emphasises that the panel has been drawn up mainly at the suggestion of and for the convenience of the Press. The list of members of the panel does not claim to include all those qualified to write for the Press neither does it restrict in any way the freedom of editors to invite contributions from chemists, nor authors to submit articles to the Press.

Articles contributed by members of the panel would be paid for at rates in conformity with those paid to members of other professions.

CHEMICAL PLANT IN GLASS

Wide Scope in Laboratory and Factory

AN outline of the properties of glass and its scope as a constructional material for chemical plant, from pilot scale to full production, was given by Mr. B. H. Turpin, director and manager of Quickfit & Quartz, Ltd., London and Stone (Staffs.), in an address to the 7th Scandinavian Chemists' Congress at Helsinki this week (THE CHEMICAL AGE, 63, 209).

Although a relatively new material in the field of plant construction, the main advantages of glass—its resistance to corrosion, visibility of contents and absence of contamination of the product—were well established in the course of years of laboratory experience. The knowledge of glass itself and of the methods of production were perhaps less familiar than those of the metals employed in chemical plant. This might be due, not only to its more recent appearance in this field, but also in some measure to the comparative scarcity of technical literature on the subject.

Thermal Expansion

After giving a history of glass manufacture and the stages of progress in the methods, from the earliest records some 11,000 years ago to the present day, embracing flint glasses and heat-resisting glasses, Mr. Turpin quoted the constituent parts of the various common and modern types and gave their respective linear coefficients of thermal expansion.

It was generally true to state that the one essential feature of a glass to be used by the chemical engineer was that of good resistance to thermal shock. The risk of accidental mechanical breakage on the plant could be tolerated, since such failure could be explained and precautions taken to prevent its recurrence. Fracture of glass units during raising and lowering of temperature, without apparent explanation, could not, however, be tolerated, since the duration of a particular plant would be unpredictable.

The property of resistance to thermal shock was controlled by the linear thermal expansion coefficient. Most glasses were poor conductors of heat, so that when glass was heated or cooled internal stresses were set up which were only slowly relieved. The lower the thermal expansion, therefore, the greater the thermal endurance and *vice versa*.

Pure silica, the basic constituent of glass, had a low coefficient of expansion and glasses with a high silica content generally possessed lower thermal expansion coefficients than those of low silica content. The low expansion or heat-resisting borosilicate glasses generally provided the material for the construction of chemical plant.

A property of glass of interest to the chemical engineer was its thermal conductivity. This in itself was extremely low, 300 times less than that of copper, and should at face value at once preclude the consideration of glass for heat exchanger work. It was well known, however, that heat exchanger efficiency was controlled by surface film conditions rather than by thermal conductivity. Metal surfaces, never as smooth as those of glass, held a considerable film of liquid or gas adjacent to the surface. These films were more readily swept away from glass surfaces, which also inhibited the tendency to scale formation.

Although the thermal conductivity of copper was so greatly higher than that of glass, new copper heat exchangers had, in fact, given results of only two to three times the efficiency of glass units, with a continued falling off in performance as the copper corroded.

Fireproof Qualities

One practical example of the resistance of glass to thermal shock concerned the use of a 15 sq. ft. condenser situated at the top of a still. While distilling acetic acid the still caught fire at the base. Flames passed both around the outside and through the centre in contact with the cooling coil still circulating cold water, until the rubber feed tubes were burnt away from the water connections. After the flames were extinguished the glass condenser was found to be intact and was put into service again.

The modern tendency in chemical plant design seemed to be towards the use of smaller, more efficient and flexible units, rather than towards very large single purpose units. This feature was, of course, very favourable for glass, since the size of vessels was obviously limited.

A quick survey of the applications of glass in commercial chemical production would indicate the following:—

Glass pipelines are used in chemical manufacture, conveying corrosive fluids,

strong acids, both gaseous and liquid, and in food manufacture for conveying fruit juices, sauces, vinegar, milk and alcoholic and other beverages.

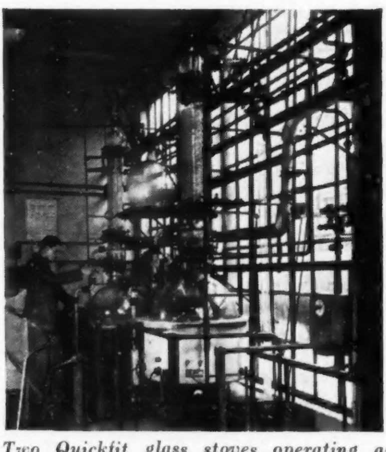
Glass condensers are used for the distillation and reflux of corrosive chemicals, acids, drugs, solvents and pyrogen-free water; the recovery of solvents often containing dissolved acids; and the recovery of alcohol from fermentation vats, etc.

Glass boilers and heat exchangers are used for the pre-heating of corrosive liquors, feeding to stills or vats as evaporators on continuous stills, and for heating liquids for large batch stills they are used as flash evaporators for purposes including the sterilisation and concentration of fruit juices.

Glass stills of batch or continuous types are used in the production of corrosive chemicals, fine chemicals, drugs, essences, flavourings and the recovery of solvents.

Glass extractors and absorption towers are use for liquid/liquid or liquid/solid extraction for gas liquid scrubbing and for gas absorption.

The field of hydrochloric acid absorption could be well covered by glass plant from small-scale to the largest plant available. In the present need for strict economy, hydrochloric acid, which might be a by-product from chlorination processes, could be recovered in the form of strong solution, using suitably designed absorbers, incorporating ring packed column sections to go with heat exchanger units, also used as packed columns. These heat exchanger units extracted the heat of solution of acid



Two Quickfit glass stoves operating as productive units

in water within the column itself, thus enabling strong acid to be recovered direct. Hydrochloric acid, which used to be a waste product, was now being recovered economically at a strength suitable for use in other processes.

A development in the manufacture of sulphuric acid which had shown considerable savings in cost in the production of analytical quality acid, was the use of glass towers for the absorption of sulphur trioxide from the vanadium catalyst plant to produce pure acid in one process. 98 per cent sulphuric acid was circulated through a glass absorption tower using an air-lift pump, distilled water added for make-up, and filtered SO_3 admitted to the base of the tower. Plant dealing with some 10 tons per day had been constructed in this way.

Large Vessels

In chemical plant which called for large vessels, vitreous enamelled metal vessels were, in many cases, used in conjunction with glass fractionating columns, condensers, and other ancillary gear, and considerable savings in cost were effected by the durability of the glass and the fact that the processes being carried on inside the plant were visible. The correct loading of a fractionating column could be maintained purely by the visual inspection of the operator. If the operation was one of chlorination, maximum input of chlorine could be effected without loss, since any un-reacted chlorine was noticeable in the glass condenser.

An industry which gained much from the properties of glass and had full-scale production within the capacity of glass plant, was the drug and fine chemical industry. Many materials were now in commercial production in glass plant which where not a commercial proposition from any other material, and glass plant had become a necessity for the production of expensive and rare drugs, including those used for intravenous injection.

Glass pipeline was simple to instal since all parts were fabricated in the works to close limits. As a general principle, glass equipment was suspended rather than clamped. Horizontal pipelines were supported on adjustable hanging brackets protected by rubber or asbestos wrapping.

Large heavy-plant units, such as columns, condensers, etc., were suspended either by rods through the flange bolt holes or by counter-balance methods. The 12-in. backing flange was provided with three hemispherical recesses so that counter-balance or adjustable screws might be used.

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DSIR Research on Refuse Disposal

EXPERIMENTS to help solve the problem of the disposal of refuse, and which incidentally will reclaim derelict land for useful purposes, are at present in progress. They are being carried out by the Chemical Research Laboratory, DSIR, in collaboration with local authorities.

The disposal of refuse is an important and awkward problem. The disadvantage of the tipping method employed indiscriminately is that it may easily cause a serious nuisance. The nuisance is caused by the growth of living organisms known as sulphate reducing bacteria. These bacteria transform sulphates in contaminated waters to hydrogen sulphide with its offensive smell.

Sulphate reducing bacteria exist in almost all soils and waters but do not begin to grow until suitable organic matter is fed to them. When rubbish containing putrescent material is tipped into a wet pit the sulphate reducers may grow very rapidly and produce large quantities of this foul smelling gas. Cases have been reported to the Chemical Research Laboratory in which the paint of nearby houses has been blackened both inside and out and it has been impossible to keep silver and copper utensils clean and bright.

The experiments now in progress are being carried out by the CRL in collaboration with the Twickenham Borough Council. A new refuse disposal works is being built in the centre of a ring of wet gravel pits, and it would be obviously desirable if the clinker from the incinerators and the fine refuse which is not incinerated could be tipped into them.

Both the materials have been tested in the laboratory. The clinker produced no sulphuretted hydrogen, even after long incubation in water, but with the fine refuse it began to evolve after only 24 hours. The borough engineer in charge of the scheme has suggested dividing one of the pits, containing about 120 million gal. of water, into lagoons holding about 1 mil. gal., the walls of the lagoons being made of the inert clinker. The idea is that the fine putrescent refuse should be tipped so quickly into the comparatively small lagoons that they should be completely filled before any nuisance develops. If any sulphuretted hydrogen should occur it could easily be stopped by adding sufficient acid to prevent further growth of the bacteria.

An experimental lagoon has been built to test the method on a practical scale. Tipping of the fine refuse has begun and early results are encouraging.

CHEMICAL PLANT IN GLASS

(continued from previous page)

It was often necessary to connect glass pipes to metal pipes, vitreous enamelled vessels and valves. For that purpose metal backing flanges drilled to suit standard metal pipe flanges were provided.

Glass chemical plant was manufactured to withstand the following conditions in service:—

Normal maximum working pressure of pipelines up to 3-in. diameter, 100 psi; 4-in. diameter, 60 psi; 6-in. diameter, 50 psi; 9-in. diameter, 20 psi; 12-in. diameter, 10 psi; higher pressures can be worked at for special requirements by arrangement with the manufacturer.

The maximum working temperature can be considered as 300° C. For temperatures above 150° C., however, precautions should be taken to prevent excessive thermal shock such as chilling with rain or snow.

Pipeline will withstand all normal pump and machinery vibrations. When connecting glass pipes to vibrating machinery rigid support should not be made within 10 ft. of the vibrating equipment. Precaution should be taken to avoid "water hammer."

Glass is suitable for use with all acids with the exceptions of hydrofluoric and hot concentrated phosphoric acids. Glass may be used successfully with dilute alkalis, but is attacked by hot strong caustic solutions.

It had, in England, become increasingly apparent that the application of glass plant had practically no limit, and many unexpected industries found it had good applications. Particular applications which had recently been given publicity in English technical journals and at exhibitions were the manufacture of the drug chloromycetin, the radioactive carbon isotope C^{14}, and pyrogen-free distilled water.

Finally, Mr. Turpin stressed the outstanding advantages of glass in industrial plant, by reason of its resistance to corrosion and its resultant maintenance costs; its purity and cleanliness; its visibility, particularly as an aid to plant control.

SILVER AND PLATINUM CATALYSTS

Some Recent Applications in German Industry

BOTH silver and metals of the platinum group have been used as oxidation and reduction catalysts for many years. The use of platinum in preparing sulphur trioxide was patented by Peregrine Philips in 1831, and the manufacture of sulphuric acid by this means became a commercial process about 1878. Not until early in the present century, however, did the chemical industry become a major consumer of noble metals for use as catalysts.

For several years the large industrial application of precious metal catalysts was confined to contact process sulphuric acid plants. The development of efficient base metal catalysts has to some extent lessened the importance of platinum in the sulphuric acid industry, but other industrial processes have since come into use requiring platinum, rhodium, palladium and silver in considerable quantities.

To-day, the largest use for platinum catalysts is for ammonia oxidation, which is now the source of almost the entire world output of nitric acid. The first technical plant for the production of nitric acid by the aerial oxidation of ammonia over a platinum catalyst was erected in Germany during 1909.

This plant was based on Ostwald's specification of 1902, and had a number of small chambers arranged to provide heat exchange between incoming and outgoing gases fitted with catalyst pads formed of pure platinum foil. Nowadays, the system most generally adopted involves the use of superposed gauze nets introduced by Kaiser (B.P. 24035/1911), but the process remains fundamentally that which Ostwald devised.

Notable Improvement

The most important modification has been the introduction by the Du Pont Company of oxidation at elevated pressure, usually 6 to 7 atmospheres, which increases the speed and efficiency of converting the oxides of nitrogen to nitric acid. The advantages gained are a reduction in the size of equipment required and a high final acid strength.

At these pressures, however, it is difficult to obtain high efficiency in the oxidation of ammonia or oxides of nitrogen. Higher temperatures must therefore be used for pressure oxidation, to obtain good conversion efficiency, and this results in a more rapid deterioration of the catalyst. Because the reaction temperature is greater than 600°C., it is evident that only the platinum group of metals is capable of withstanding the conditions while remaining in metallic form.

The need for longer catalyst life at very high temperatures led to the introduction of rhodium-platinum alloys containing up to 10 per cent of rhodium, which have a much lower loss rate at high temperatures than that of pure platinum.

Loss of Metal

The economic value of a catalyst depends upon loss of metal conversion efficiency and capacity. An alloy with extremely high conversion efficiency may be entirely uneconomical in use because of the resulting high loss of metal. Pure platinum-rhodium alloys are more economical and useful for oxidation at elevated temperature than any other catalysts. With few exceptions, the efficiency of base metal catalysts is too low for economic use despite their relatively low cost.

One disadvantage of platinum group metals for this application is that even minute traces of certain materials can poison the catalyst. Great care has to be taken to eliminate them completely. Modern developments in metal-refining have overcome many of the difficulties formerly encountered. To-day, most high pressure plants use gauze woven from 10 per cent rhodium-platinum wire arranged in multi-layer catalyst pads of 20 to 30 individual nets. This enables a very large quantity of ammonia—for example—to be oxidised in a relatively small converter. Close chemical and metallurgical control of the wire properties is essential. Great care and skill are required to weave these very soft, fine wires into blemish-free gauze, which, in rhodium-platinum for ammonia oxidation, is woven in widths up to 9 or 10 ft. continuously.

Pure platinum is an effective catalyst over a wider range of conditions than the rhodium-platinum alloys. It is usually preferred, therefore, for nitration process sulphuric acid plants. Most of these plants are supplied with nitrogen oxides by a small oxidation unit, generally of the United Alkali pattern with a built-in heat exchanger, and fitted with a pad of four rectangular gauzes mounted vertically.

The process requires a flexible supply of the oxides and, whereas the ammonia

burners of a nitric acid plant generally operate under almost constant load, these small units are worked at capacities ranging from less than 50 per cent to more than 200 per cent of normal. A special gauze, woven from wire of diameter 0.0026 in., is used in these small units since the lighter material is more satisfactory.

Platinum is also used extensively as a hydrogenation catalyst in organic synthesis. For this purpose it is dispersed on the surface of carriers such as pumice or charcoal, or may be used directly in the form of platinum black without a support.

German Process

Of all the metals, palladium has the greatest affinity for hydrogen and is a very active hydrogenation catalyst. The direct hydrogenation of acetylene to ethylene with hydrogen, using a palladium catalyst, was carried out on a large scale in Germany during the war. One interesting plant is described in BIOS final report No. 1411. It had a capacity of 3000 tons of ethylene per month and the product was used during the war for the production of glycol and mustard gas.

The process consisted of passing acetylene and an excess of hydrogen and steam over a catalyst of palladium in silica gel at about 270° C. and under ordinary pressure. The gas produced was collected in a gasometer and separated in a Linde plant. The recovered hydrogen was returned to process.

The consumption of catalyst amounted to 1 kg. of palladium per 1600-1800 tons of ethylene produced. Because the palladium catalyst was present in great dispersion in the silica gel purity of the raw materials—particularly of the acetylene—was of great importance for long catalyst life.

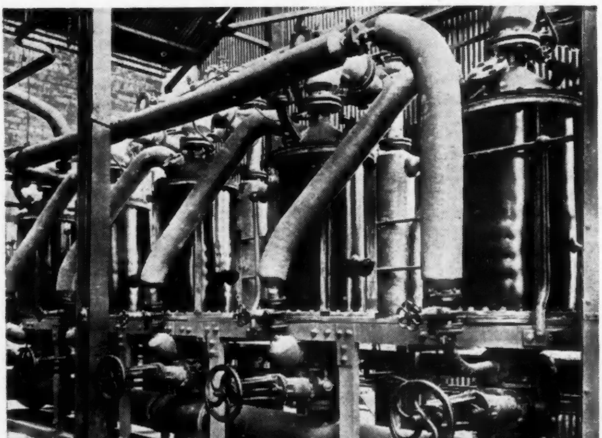
The spent catalyst contained from 30 to 40 per cent of organic matter, mainly cuprene and tarry materials, which were removed by treatment with superheated steam and air. After this the catalyst was taken from the furnace and screened. The regenerated catalyst was either stored or returned to the hydrogenators in the same way as fresh catalyst. Loss during the regeneration process amounted to about 10 per cent of the catalyst.

Palladium also finds limited use as a catalyst for the purification of oxygen and hydrogen and for the removal of residual oxygen from atmospheres required for bright annealing and other operations where complete freedom from oxygen is necessary.

Methyl Alcohol

Silver has almost universally replaced copper in the catalytic vapour-phase dehydrogenation of methyl and ethyl alcohols. The great volume of formaldehyde solution consumed industrially is almost all manufactured by the dehydrogenation of methyl alcohol. The process requires the passage of a stream of water vapour, air and an excess of alcohol vapour through a catalyst bed, maintained at about 600°C. by the heat of reaction.

After condensation, the products are fractionated and the small proportion of unconverted alcohol is recycled. In a few



Furnaces for the production of acetaldehyde from ethyl alcohol. Each furnace is provided with a catalyst bed of pure silver gauze

instances the silver catalyst is dispersed on a carrier, pure recrystallised silver nitrate being employed. In most existing installations, however, the catalyst is either a thick pad of many layers of silver gauze or a shallow bed of crystalline silver. The crystalline catalyst is prepared by electrodeposition under conditions regulated to produce hard crystals. These are screened into close size ranges.

The similar reaction of ethanol vapour with air is also used industrially on a considerable scale. The acetaldehyde thus produced is mainly consumed as an intermediate in the manufacture of crotonaldehyde, n-butyl alcohol and acetic acid. Certain higher aldehydes are similarly manufactured, and there are a number of other oxidation reactions for which silver is a useful catalyst.

Two notable examples of the catalytic use of silver in formaldehyde production are afforded by the I. G. Farbenindustrie plants at Ludwigshafen and Leverkusan (BIOS final report No. 1331).

The process is based on the oxidation and dehydrogenation of methanol with a granular silver catalyst at a high temperature. Air is saturated with a mixture of methyl alcohol and water in the ratio of 3 : 2 and is passed over the catalyst maintained at 640-660°C. The product is cooled and condensed and the gases are scrubbed. Formaldehyde is collected and brought to a standard strength of 30 per cent weight.

Electrolysis

The silver catalyst is produced by the electrolysis of a solution of silver nitrate containing 3 per cent $AgNo_3$ and 0.1 per cent HNO_3. The solution is warmed to about 45°C. The electrolyser consists of four platinum strip anodes and a large silver cathode. Metallic silver in linen bags is placed about the anodes, where it is dissolved. It is deposited on the silver cathode, and is stripped off by a continuous mechanical scraper. To maintain a uniform concentration, the solution is kept agitated during electrolysis by passing air through a perforated glass tube lying on the bottom of the cell.

The accumulated deposit of granular silver is removed from the cell at about 20 hour periods. The adhering nitrate solution is resorbed and returned to the cell bath, which is kept at a constant level. The silver is then thoroughly washed with distilled water, dried and heated at a dull red heat for one hour in an electrical oven.

Exhausted catalyst is regenerated by heating at a dull red heat for one hour in a current of air, followed by a few minutes

[Both photographs by courtesy of Johnson, Matthey & Co., Ltd.

Activated crystalline silver catalyst material used for the production of aldehydes by the vapour-phase dehydrogenation of ethyl and methyl alcohols

heating in a current of oxygen. The silver is then treated with pure concentrated hydrochloric acid and allowed to stand overnight to remove any iron or copper. The acid is drained off and the silver is washed with distilled water until all traces of chlorine have been eliminated. Finally, the silver is allowed to stand for 12 hours in a weak solution of ammonia. It is then drained, again washed with distilled water, dried and heated for one hour at a dull red heat in a current of air.

One of the most interesting reactions for which silver is a useful catalyst is the aerial oxidation of ethylene as a route to ethylene glycol, which avoids the chlorhydrin stage. A plant was erected by I. G. Farbenindustrie at Zweckel to produce 100 tons of ethylene oxide monthly, by the direct oxidation of ethylene with air and/or oxygen. Though economically competitive with the more usual chlorhydrination method the plant was never completed. It is described in FIAT 875 and involves the use of both silver and palladium catalysts.

Oxidation Chambers

The silver catalyst to have been used was a pure silver-on-pumice composition manufactured in the oxidation plant. It was prepared by impregnating pumice with silver oxide and subsequently reducing this product in a silver-lined reactor, using a nitrogen-hydrogen mixture at 200°C. There were altogether four multi-tubular oxidation chambers, containing about 12,000 tubes and charged with a catalyst mass embodying 120,000 oz. of silver.

Properly handled, this catalyst was expected to have a life of one year, based on laboratory and pre-pilot plant experi-

(continued at foot of page 295)]

ZIRCONIUM SILICATE

Some Recent Commercial Applications

ZIRCONIUM silicate, or zircon, $ZrO_2.SiO_2$, occurs in most types of igneous rocks but it is produced chiefly as a fine-grained material from detrital sediments formed by weathering of the parent rock, accompanied by gradual concentration of the heavier elements. The main sources of supply are Australia, where its recovery has been developed extensively on the New South Wales coast and also on the Queensland border; in India, where the chief centre of production is Travancore State; and the U.S.A.

Zircon is not only a good refractory material, it possesses other properties of value to industry. It is a good electrical insulator, even at high temperatures, and imparts good heat shock resistance to components made from it. Zircon is practically insoluble in most mineral and organic acids, and is unaffected by aqueous alkalis. It is, however, decomposed by alkaline fusions.

Ceramics and Abrasives

These properties make zirconium silicate valuable in the ceramics, superrefractories and abrasives industries and for the manufacture of dental and high-temperature casting cements, and for the construction of foundry cores and moulds. The melting point of zirconium silicate varies between 2200° and 2300°C., depending on purity, and it has a specific gravity of 4.65; its coefficient of expansion is very low.

One of the most recent and rapidly expanding fields in which zircon is proving useful is in foundry practice for grey iron, steel, some types of bronze, and light alloy castings. The thermal conductivity of zircon sand is much higher than that of silica sand hitherto used in foundries, and this is a big advantage in the construction of moulds and cores, because the more rapid chilling provided by zircon sand produces superior castings. Zircon promotes better feeding in heavy metallic sections, with less tendency toward hot-tearing.

Because of the very fine grain size of zircon sand, the permeability rating is much lower than that of other sands. Zircon sand cores need not, however, be vented more than cores made of ordinary silica sand.

Zirconium silicate sand has spherical particles, and the grains make contact with each other at only a small portion of their surface area, so leaving definite interstices between the particles. Because of this the passage of gases through the sand is more readily achieved than with sands composed of irregular angular grains of the same size. This makes possible the use of a finer mesh round-grain sand without losing of good permeability.

Zircon sand is also used as a lining for induction melting furnaces, and as a seal for metal heat-treating furnaces. Its high hardness and low free silica content make it effective in cleaning non-ferrous castings where high-silica sands are objectionable, due to infectious silicosis. Here, its property of closing up minor surface imperfections by peening action is also useful.

Both cores or moulds may be made entirely of zircon sand, but for economy —when they are relatively large—they may be faced to a depth of ¼ in., the main body of the core or mould consisting of other material. To give the same strength, much less core oil is required in zircon sand cores than in silica sand cores.

The use of a small proportion of cereal binder gives cores of greater green strength which are more easily handled. A typical mix would be: 35 parts zircon sand, 1 core oil, 0.2 starch, and 1 part water.

Use as a Chilling Medium

In the construction of cores and moulds for magnesium castings, zircon sand is supplanting silica sand and metal shot as a chilling medium, because zircon sand extracts heat more rapidly from certain critical areas in the castings, on account of its high thermal conductivity.

Zircon flour is merely zircon sand finely milled to a particle size of about 325 mesh, as compared with that of the sand which ranges between 80 and 200 mesh. The flour is applied to the surface of a core or mould as a wash, and a small proportion of Bentonite or other colloidal clay is added, together with core oil or a cereal binder.

Synthetic zirconium silicate is produced by high temperature chemical reaction between the two oxides, zirconia and silica, made possible by the use of ethyl silicate as a bonding liquid. The process

depends on the very reactive nature of the silicate deposited during the hydrolysis of the ethyl silicate. Using 10 per cent silica and 90 per cent zirconia, a product is obtained having a melting point of about 2600°C.

In the commercial production of synthetic zircon, use is made of silesters, which are liquids containing 40 per cent by weight of silica. They may be considered as convenient alternatives to fluxes and clays, for they yield silica in a reactive and adhesive form. The silester bonding process makes possible the synthesis of a whole series of silicates such as mullite, $3Al_2O_3.2SiO_2$ and forsterite, $2MgO_2.SiO_2$; in addition to zircon, from high quality sillimanite or alumina, magnesia and zirconia.

Because clays and fluxes are eliminated, these manufactured products have better qualities. The ease with which awkward shapes are produced in fine detail by the use of simple types of moulds, and with physical properties varied to meet specific needs, is another advantage of this technique. One type of synthetic zircon has a comprehensive strength of over 20,000 lb. p.s.i. and a Moh scale hardness of 7.5.

Some typical applications of synthetic zircon include interiors for gas-, electric-, or oil-fired furnaces; liners and formers for electric muffle furnaces; insulators, sleeves and inserts for low-frequency coils; burner blocks and element-retaining bricks; tubes for high-temperature furnaces working in inert atmospheres; crucibles; saggers for furnace or kiln apertures. The product is also being used for work in connection with jet aeroplane design and atomic energy research. Zircon refractories are used fairly widely in the manufacture of phosphates, in aluminium refining, and in the production of precious metals, etc.

Zirconium silicate electrical cements are now applied to the electrical insulation of heater units. In this capacity they exhibit very low operating and humidification leakages and extremely fast returns to normal after humidification tests are completed.

A typical cement of this character applied to the insulation of laundry irons shows an operating leakage of only 0.002 mA., a standard humidification test leakage of 0.1 mA., and a return to normal in 15 to 30 seconds. Another grade of electrical cement, used for the insulation of electrical elements, shows an operating leakage of 0.02 mA., a humidification test leakage of 0.5 mA., and a return to normal within 10 to 15 seconds.

SILVER AND PLATINUM CATALYSTS

(continued from page 293)

ments. No satisfactory regenerative technique had been discovered. Apparently, a spent catalyst can only be treated to regenerate silver nitrate.

The ethylene at Zweckel is derived from coking operations. It contains about 0.5 per cent acetylene, which has to be removed because it is decomposed by the silver catalyst, with deposition of carbon and a rapid fall in activity. A palladium-on-silica hydrogenation catalyst developed by the acetylene group at Ludwigshafen was to have been used in the ethylene stream.

When pure acetylene is hydrogenated, the concurrent formation of ethane is only 5 per cent. In the present instance of dilute acetylene in ethylene, only a very small amount of ethane is formed, which neither reacts appreciably over the silver oxidation catalyst nor interferes with the process.

The palladium contact mass is prepared by dissolving palladium nitrate in distilled water with weak nitric acid, yielding a solution containing 11 per cent palladium. The stock solution is diluted to a concentration of two grams palladium per litre and used to impregnate 2-6 mm. dia. silica gel. The gel is heated to 100-150°C., sufficient solution being added to give a catalyst having a 0.03 to 0.05 per cent palladium content.

The life of this catalyst for pure acetylene hydrogenation is between six months and one year, so that in the application described a longer life might reasonably be expected. The catalyst can be reactivated by burning off the accumulated carbonaceous matter with air gas. Apparently, the high temperature involved does not sinter or otherwise harm the material.

Nowadays, platinum and silver, both for catalysts and process equipment, are produced at a purity of 99.99 per cent, the former by chemical refining and the latter by repeated electrolytic refining. The British firm of Johnson, Matthey & Co., Ltd., have been closely associated with catalyst users in devising forms of greater efficiency and in establishing the necessary large-scale manufacturing techniques. The development of more efficient materials and processes is constantly extending the applications of noble metals as industrial catalysts where in many cases the relatively high cost is more than offset by the greater efficiency and long service life.

MINIATURE MAGNETIC BAR STIRRERS

Details of Simple Construction

by JOHN T. STOCK, M.Sc., Ph.D., F.R.I.C., and M. A. FILL, F.R.I.C.

INTEREST in the design of small-scale stirring apparatus has been on an increasing scale for some years. Present developments include vacuum-operated devices both reciprocating[1,2] and rotary,[3,4] a simple electric pump for stirring by means of a stream of air bubbles[5] and, more recently, miniature magnetic stirrers.[4,6,7] Because of its general utility, the last type created considerable interest when first exhibited,* and there have since been a number of inquiries about it, so that a fuller account of the design and construction is called for.

Several versions have been constructed. Fig. 1 gives a general view of three of them. All work very well and are valuable for small-scale titration or for potentiometric and conductometric techniques. The general-purpose bench model (A) is 5 in. long by 3¾ in. wide by 3¼ in. high. The top or titration platform is of white Perspex 1/16 in. thick, and a ⅛ in. thick front panel of the same material carries the switch and speed controller. The connecting leads are detachable, an accumulator or other external battery being used only when long runs are required. For ordinary work, energy is drawn from an internal flashlamp battery, so that the unit is self-contained. A competent technician can make one of these stirrers in a day.

Details of construction are shown in Fig. 2. A wooden cross-member A carries an electrotor B (obtainable for about 10s. from most shops dealing in model-making materials), mounted with the spindle vertical. The motor is held down by a bent strip of tinplate, which also partially isolates the magnetic field of the motor from that of the magnet above it. In the early models, an Eclipse pocket horseshoe magnet C was cemented in a cork or wooden cradle D which was in turn attached to the motor spindle by sealing wax.

Later, through the courtesy of James Neill (Sheffield), Ltd., some very small but extremely powerful Type M.4776A magnets were provided in the form of short slotted cylinders with central holes. A magnet of this type is easily mounted directly upon the motor spindle, as shown at (a). The light weight and small height greatly contribute to the freedom from vibration and long motor life which is characteristic of the later stirrers.

When the mounting operation is completed, the assembly should spin freely and the poles of the magnet should describe a circle in a plane parallel to the Perspex top E. Small brass washers or other packing pieces FF permit the clearance between the magnet and the underside of the top to be adjusted; a suitable clearance is about 2 mm.

Mounted adjacent to on-off switch G is a variable resistor H, of maximum resistance 10 ohms or a little higher, which permits the speed of the motor to be adjusted to a few hundred revolutions per minute. Operation at such low speeds gives excellent stirring, minimises current consumption and enables long runs to be undertaken without overheating the motor.

When H is set for a very low speed there is sometimes failure to start, although the motor at once picks up if the speed control is momentarily turned in the "increase" direction.

Mr. G. Ingram[8] is responsible for the suggestion that a booster button J should be incorporated. When this is depressed, resistor H is short-circuited. On switching on, the motor then receives the full battery voltage and never fails to start. The booster button is then released, when the

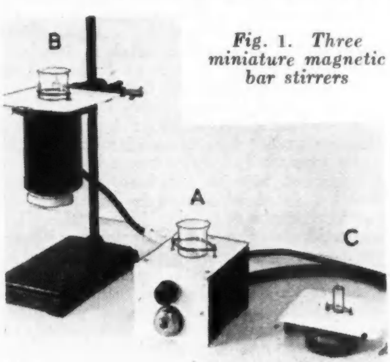


Fig. 1. *Three miniature magnetic bar stirrers*

*At the annual general meeting of the Microchemistry Group of The Society of Public Analysts and Other Analytical Chemists, in London, January 1950.

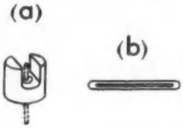
speed drops back to the predetermined level.

The contact strips of internal flashlamp battery I press upon small brass plates which are wired to the motor, resistor, etc.

Shown enlarged is the stirrer-bar (b), which is made from melting-point tubing. The core is either a portion of a needle or a few strands of fine iron wire and is slipped in before the second end of the tubing is closed in the blowpipe flame. For work in narrow vessels, the stirrer-bar may be less than 10 mm. long; in general, a length of from 10 to 20 mm. is suitable.

Having measured out the sample, a stirrer-bar is dropped into the vessel. On placing the latter centrally upon the titration platform and starting the motor, the stirrer-bar spins, following the motion of the magnet. For ordinary work, small beakers or conical flasks may be used, while the smaller vessels needed for working with limited volumes may be cut-down specimen tubes.

In this way, it was possible to perform successfully the conductometric titration of samples less than 1 ml. in volume. When the limited mouth area of the titration vessel is further reduced by the presence of electrode-assemblies, etc., the benefit of this method of stirring is fully realised. Particularly is this so when ingress of air or escape of vapour must be avoided, so that the titration vessel has to be hermetically sealed, as in the Karl Fischer method of moisture determination.



Motor spindle and stirrer bar (enlarged)

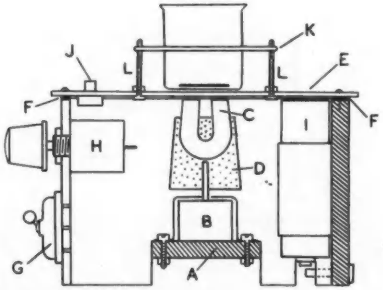


Fig. 2. Bench-type stirrer with internal battery

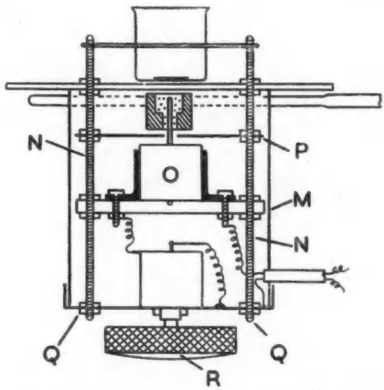


Fig. 3. Details of ring-mounting model

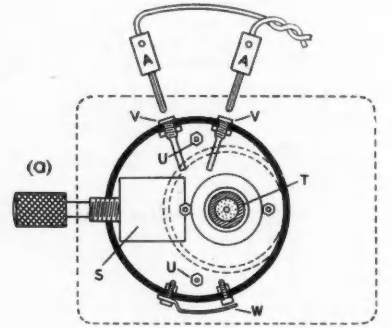
Besides being easily controllable, the stirring action is most powerful at the bottom of the liquid, so that splashing does not result even when the motion is rapid. Because of the vigorous agitation, the smaller titration vessels have a tendency to "wander" on the Perspex platform. This is prevented by rubber band K, stretched between pillars LL of No. 6 B.A. brass screw rod, which grips the titration vessel. The band may conveniently be made from a length of cycle valve tubing joined by a short piece of glass rod.

After having operated one of these stirrers for some 150 hours, including one non-stop run of 12 hours and several of eight hours the tiny bearings of the motor appear to be good for much more work.

To prevent loss of the stirrer-bar when emptying the titration vessel, a varnished or glass-enclosed bar magnet may be used to recover the stirrer. An alternative is to pour the contents of the vessel through a Buchner funnel (without filter paper).

A second version of the stirrer (B, Fig. 1) is designed for use on a retort stand. The cylindrical body slides freely into a retort ring of suitable size and the whole unit is firmly secured by four small Terry spring clips. These are screwed to the underside of the white Perspex platform and, when the latter is pressed cautiously and squarely downwards, snap over the thickness of the ring. Details of construction are shown in Fig. 3.

Body M is a slip-lid tin canister. The bottom, which is arranged upwards, is cut away, so that the magnetic field is not interfered with. The No. 4 B.A. brass screw rod pillars NN carrying the rubber



securing band pass right through the body of the apparatus. They thus support the motor assembly O, the tinplate screen P above it, and, with the aid of external nuts QQ, they retain the bottom cover. The latter is the lid of the canister and carries controlling resistor R.

By releasing the two nuts QQ, the bottom cover and body may be slipped downwards, leaving the motor assembly exposed for inspection and adjustments. The on-off switch, of the miniature pear type, is incorporated in the connecting leads.

Bottle-Cap Construction

At C (Fig. 1) is shown a third, low-built, version of the stirrer. The body consists of a pair of 2¼-in.-diameter flat black bakelite caps, as used on reagent bottles, placed mouth-to-mouth. A plan view with the top half of the body removed is shown at (a) in Fig. 4. Controlling resistor S, which is of the miniature variety and about ¾ in. diameter, and motor assembly T are retained in position by partially imbedding in sealing wax. This is done by adding the wax in small lumps and working in with a heated narrow tool.

Three holes are previously drilled in the cap; one accommodates the slightly-projecting lower end of the motor spindle while the other two allow the passage of No. 6 B.A. brass bolts UU which hold down the upper half of the body. Sockets VV and booster switch W and the appropriate wiring complete this part of the assembly. The booster switch is merely a strip of resilient brass about ½ in. wide which, when pressed, will make contact with the head of a small brass bolt. When this is done, the resistor is short-circuited and the motor receives the full input voltage.

A hole about ⅜ in. in diameter in the upper half of the body allows the magnet to project through, as shown at (b), Fig. 4.

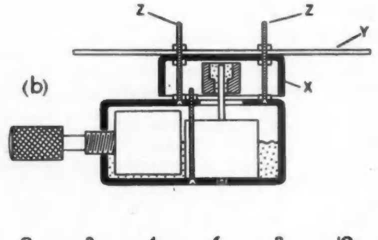


Fig. 4. Left, plan view, and right, side view of a low-built stirrer constructed of bottle caps

Surmounting the magnet is a third, smaller, bottle cap X, and the square white Perspex titration platform Y. These parts are retained by bolts ZZ, the nuts on which allow the clearance between the magnet and the underside of X to be adjusted. As in the previous version, the on-off switch is arranged in the connecting leads, which terminate in banana plugs AA (a) for insertion into the sockets.

Several stirrer units of this type, some having minor modifications such as the location of the booster switch, reduced size of platform, etc., have been made and have given very good service. It seems that the design could be adapted for quantity production at a reasonable cost.

A similar form of construction is used in the vacuum-operated version[4,7] shown in Fig. 5. The bakelite caps forming the body are held together by a band of transparent adhesive tape.

Magnet B is held by sealing wax on the upper end of spindle C, which is part of a darning needle. A short length of heavy-

(continued at foot of next page)

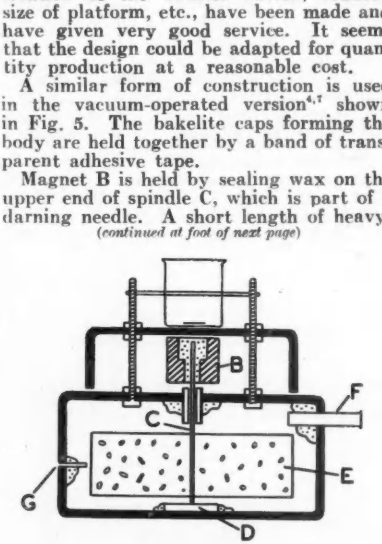


Fig. 5. Vacuum-operated magnetic stirrer

Methyl Bromide Poisoning

Wider Knowledge of Hazards Urged

A RECENT fatal case of poisoning due to inhalation of methyl bromide is the subject of a report by Drs. A. C. MacDonald, J. C. Monro and G. I. Scott in the *British Medical Journal* (4676, 441). They are of the opinion that the dangers of exposure to this compound should be better known in view of its recent wide use in such things as fire extinguishers for ships and aircraft and in refrigeration plants. The case reviewed arose from the scrapping of fire extinguishers from aircraft engines, which involved emptying and cleaning them.

The method was to perforate the lower end of the copper bottle with a fireman's hatchet to let the vapour and fluid escape. Thereafter the brass top was sawn off the bottle. Normally, all this was done in the open air, but on the day in question the weather necessitated the cleaning of the empty bottles in a shed. In the course of his work, the victim had splashed a quantity of liquid methyl bromide over his clothes and a little of it reached his face.

On examination, the patient was having recurring convulsive seizures at the rate of about 10 a minute. These affected the jaw, back, both arms, and legs. He was unconscious, and his breath had a pronounced alcoholic odour. The convulsions came on quite suddenly.

The doctors recall that methyl bromide, like chloroform, ethyl chloride and carbon tetrachloride, is not inflammable and its use as an extinguisher depends on its weight—the gas is six times as heavy as air—and its blanketing effect.

Its mode of action depends largely on the concentration. If this is of the order of 10,000 p.p.m. the gas acts as a lung irritant. The results of relatively prolonged exposure would be haemorrhage and oedema of the lung and pleural effusion. Oxygen may be effective in treating this class of case.

After inhalation of a concentration in the neighbourhood of 1000 p.p.m. there are slight non-characteristic symptoms, such as headache, giddiness, fatigue, vomiting, and double vision. There may then be a free interval of hours or even days, followed by the sudden onset of twitching, lockjaw, cramps, double vision, delirium, and raving madness.

No curative treatment is known when convulsions have begun and there is stated to be only one instance of recovery after the onset of convulsions.

Exposure to minimal concentrations of the order of 200-400 p.p.m. results in loss of appetite, nausea, headache, and muscular pains, the symptoms rapidly disappearing on cessation of exposure. Prolonged application of methyl bromide to the skin may lead to burning. It is clear, however, that this does not always happen, as workmen have used it to remove grease from their hands without ill effect. There is, in fact, a strong suggestion of idiosyncrasy.

One feature common to all the reported cases the present authors have studied is its occurrence in an enclosed space, such as a ship, covered railway wagon, or workshop.

MINIATURE MAGNETIC BAR STIRRERS

(continued from previous page)

walled glass tubing, in which the spindle is a snugly-running fit, is the upper bearing, while the point of the needle bears upon D, a portion of a microscope slide.

Rotor E is a slice cut from an ordinary cork and having some 32 ratchet-shaped teeth cut in its circumference. The cutting of these teeth with the aid of a razor blade requires a little practice. The usual fault is low tooth strength, which can be considerably alleviated by varnishing immediately after cutting.

Rotation is set up by applying suction to side tube F, when the stream of air entering through jet G strikes the rotor tangentially. The method of construction reduces frictional losses to the minimum and, although the device is intended to be used with light filter-pump suction, rapid rotation can be obtained with mouth suction.

A practical point in the making of sealing wax joints to Bakelite is to roughen the surface of the latter with a sharp file.

RERERENCES

1 Stock, J. T., and Fill, M.A. *Analyst*, 69, 212.
2 Ditto 71, 536.
3 Ditto 74, 318.
4 Ditto, *Metallurgia*, 41, 239.
5 Ditto *Analyst*, 74, 52.
6 Stock, J. T., *Metallurgia*, 42, 48.
7 Ditto THE CHEMICAL AGE, 62, 605.
8 Ingram, G., Private communication.

PERSONAL

DR. F. SHERWOOD TAYLOR has been appointed director of the Science Museum, London. Dr. Taylor, who is 52, has been curator of the Museum of History of Science at Oxford. He is honorary editor of *Abbix,* journal of the Society for the Study of Alchemy and Early Chemistry, and is also honorary assistant editor of *Chymia*. From 1933-1938 he was assistant lecturer in inorganic chemistry at Queen Mary College, London. The doctor will take up his new duties on October 1.

MR. C. R. MIDDLETON has been appointed manager at Shell's Stanlow refinery, Ellesmere Port, in succession to MR. F. MACKLEY, who has been transferred to head office. Mr. Middleton, who joined the Shell organisation in 1924, has served in practically all the Group Refinery operating areas throughout the world.

The Air Ministry and Ministry of Supply announced this week that AIR CHIEF MARSHAL SIR W. ALEC CORYTON had been appointed Chief Executive, Guided Weapons, a post which has been created at the Ministry of Supply to accelerate and co-ordinate all work in research, development and production in this field. The post of Controller of Supplies (Air) formerly held by Sir W. A. Coryton will be assumed by AIR VICE-MARSHAL J. N. BOOTHMAN, who will become an additional member of the Air Council and be promoted to the acting rank of Air Marshal. Both appointments take effect from September 4.

MR. ERNEST RAMSAY, The Priory, Foxhouse Road, Whitehaven, director of Robert Frazer and Sons, Ltd., iron and steel stockholders, left £18,336, net £17,963.

MR. FREDERICK HARRISON TOOGOOD, Roslin Road, Irby, Wirral, for 34 years with the British Oxygen Co., left £1,158, net £1,074.

Next Week's Events

TUESDAY, AUGUST 29

British Food Fair

London: Olympia. British Food Fair.

WEDNESDAY, AUGUST 30

British Association

Birmingham: Meeting of the British Association for the Advancement of Science. Until September 6.

Industrial Finishes Exhibition

London: Earls Court. Industrial Finishes Exhibition. Until September 7.

EFFICIENT USE OF POWER

"ENERGY in the Service of Man" is the theme of the annual meeting of the British Association for the Advancement of Science which opens in Birmingham next week.

A special exhibition, arranged by the association, was opened by the president, Sir Harold Hartley, at the university last week. Displays indicate developments for the more efficient use of power being made by the National Coal Board, the Gas Council and the British Electricity Authority.

Chemical and physical advances in the carbonising industry are demonstrated by the Gas Council in co-operation with the West Midlands Gas Board, also a full display of laboratory equipment for specialist purposes. Models on view include a gas works of modern design, and a gas turbine (seen in section) working on a closed circuit, using waste heat by means of a heat exchange unit.

The coal section deals progressively with the development of mining from early times to a working model of the latest Samson stripper.

In the electricity exhibit two large-scale models show new methods in power station cooling systems. The exhibition is open until next Tuesday, and then again on September 7, 8 and 9 on conclusion of the British Association conference.

Graz Microchemical Congress

AT the First International Microchemical Congress, organised by the Austrian Microchemical Society, held at Graz last month, much interest was aroused by the new microchemical balance shown by L. Oertling, Ltd., London. This was illustrated on page 119 of the July 22 issue of THE CHEMICAL AGE. In addition to being aperiodic and having weight loading, it provides a direct reading of 1.0 microgram per division of a large illuminated scale projected at eye level within the balance case.

Subsidised Inorganic Fertilisers

Fertilisers eligible for assistance under the Ministry of Agriculture's scheme for encouraging their use on grassland have now been precisely defined, and comprise all the commonly used inorganic fertilisers, namely: Basic slag; compound fertilisers (including nitro-chalk); ground phosphate rock; muriate of potash; sulphate of ammonia; sulphate of potash; superphosphate of lime (ordinary and triple).

OVERSEAS

Plans for Venezuelan Steel

The Venezuelan Development Corporation has contracted with the Salem Engineering Corporation of Canada to survey a site for a steel plant near the Orinoco river and the Guaijana iron deposits.

Canada's Copper Output

In the first half of this year Canada increased her copper output to 133,296 tons from 128,931 tons in the January-June period of 1949, but produced only 61,837 tons of nickel compared with 68,038, reports the Dominion Bureau of Statistics.

Belgian Congo Minerals Plan

A 10-year plan by the Belgian Government for developing the minerals of the Belgian Congo calls for an annual production of 180,000 tons of copper, 20,000 tons of tin, as well as large increases in the production of cobalt gold, silver, industrial diamonds.

Largest Vacuum Flasher for U.S.

According to the M. W. Kellogg Company, a new vacuum flashing unit to be built by them for the Standard Oil Company at Richmond, California, will include a main vessel 80 ft. high and with a maximum diameter of 27 ft. whose capacity, it is believed, will be 15 per cent greater than any existing vacuum unit. The new unit will be able to charge 55,000 barrels of reduced crude oil a day.

Manganese in Bihar

The discovery of extensive manganese ore deposits in Kalahandi, Bihar, with total reserves estimated at 1 million tons, has been reported in the quarterly report (January-March) of the Geological Survey of India. Prospecting was carried out in respect of the bauxite deposits in Tungar Hill, Bombay, and geophysical investigation of a copper area in Madras was conducted.

U.S. Aluminium Production

Output of primary aluminium in the U.S.A. in May reached 61,929 short tons, the highest domestic production since July 1944. The average daily rate reached nearly 2000 tons, according to the U.S. Bureau of Mines. Stocks at the end of the month were 16,341 short tons, an improvement of 2704 tons on the figures at the end of April. The first change in price of virgin aluminium for 19 months was announced on May 19 by the Aluminium Co. of America with a rise of one-half cent a pound.

Glass Arrests Atomic Radiation

Two types of glass which can be used in spectacles to protect the eyes from atomic radiation are reported to have been developed by scientists at Pittsburgh University, U.S.A. They will be used by workers in atomic laboratories.

Utrecht International Industries Fair

At the 55th International Industries Fair, to be held at Utrecht, Holland, from September 5 to 14 inclusive, two of the largest sections will be devoted respectively to pharmaceutical products and medical instruments and equipment.

Indian Board of Engineering

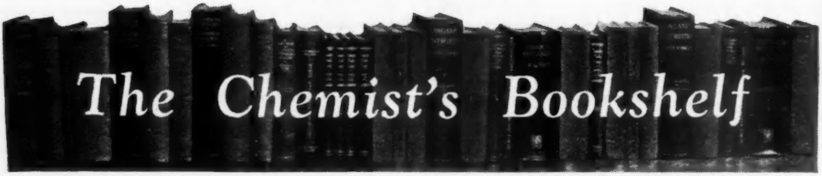
A board of India engineering research to function as an advisory body to the governing body of the Council of Scientific and Industrial Research has been formed in India. Its main functions will be to initiate and co-ordinate research work in the various branches of engineering.

Unwanted Arsenic

Swedish exports of arsenic are falling, it has been announced by the Boldens Gruwx A/B, the only Swedish firm producing arsenic. The reason given is that arsenic is less used in agriculture than formerly and supplies can now be obtained from a variety of sources. The company announces that it has thousands of tons on its hands for which there appears to be no likely consumer.

Swedish Iron Sponge Method for Venezuela

The so-called iron sponge method may, according to *Svenska Dagbladet*, be used in exploiting the immense iron-ore deposits recently discovered at Cerro Bolivar, formerly known as Mt. La Parida, south of the Orinoco River in eastern Venezuela. This application of the method has been developed by Professor Martin Wiberg, of the University College of Technology in Stockholm, and is now practised at the Söderfors plant in Central Sweden. Here both charcoal and coke are employed in extraction with the aid of electric power. Since coal and other power resources are limited in Venezuela, while crude oil is abundant, experiments are taking place with a view to adapting the Swedish method to oil. The plans have been drawn up in co-operation with Dr. Magnus Tigerschiöld, of Sweden's Iron Masters' Association, who recently visited Venezuela at the invitation of the Government there.



The Chemist's Bookshelf

THE PETROLEUM CHEMICALS INDUSTRY, by R. F. Goldstein. Foreword by Professor Sir Robert Robinson. London, E. & F. N. Spon, Ltd. Pp. 449. 63s.

At the present time, when the foundations of a large petroleum chemicals industry is being laid in this country, it is appropriate that a volume such as this, from the pen of a British author, should be published.

The book is concerned with the manufacture of synthetic organic chemicals based on petroleum as the starting material. This, as the author points out, is the third and newest of the three principal basic raw materials, coal, vegetable matter and mineral oil, from which almost all industrial organic compounds are manufactured.

Before the war, we in this country were many years behind the Americans in the "know how" of petroleum chemistry. In fact, the setting up of a petroleum chemicals industry over here would have met with great difficulty because of the duty on hydrocarbon oils then in existence. After the war, the realisation of the importance of such an industry to this country led to the abolition of this duty and the opening of the door to British firms. The oil companies were quick to take advantage of this. Chemical plant for this new industry is now springing up all over the country, and is a heartening sign of the flourishing state of the British petroleum chemicals industry.

In this volume the author has endeavoured to survey the field of industrial organic chemistry in which oil is the most economic starting material, but to make the competitive position reasonably clear, information on alternative non-petroleum routes has been included, where appropriate. It has also been considered worth while to include subjects where the oil route has not yet been established as the most economic one, but where improvements in technique may swing the balance in its favour.

To keep the book within bounds, the choice of subject matter was highly selective. Although the chemistry of petroleum derivatives leads predominantly to aliphatic compounds, the manufacture of aromatic hydrocarbons from petroleum is dealt with in some detail. The chemical developments based on these petroleum aromatics are, however, excluded. Similarly, the manufacture of raw materials from petroleum for the high polymer industry is referred to, but the polymerisation step is not discussed.

The chemistry and technology of the petroleum industry, which deals mainly with the manufacture of fuels and lubricants from crude petroleum, has been discussed only in so far as it is relevant to the petroleum chemicals industry: manufacture of carbon black, which is based almost exclusively on petroleum, but which does not lead to synthetic organic chemicals, has not yet been included.

The book is divided as follows: Chapter 1 deals with the source of materials of the petroleum chemicals industry, the hydrocarbons present in crude petroleum or produced as by-products in the refining operations. Chapters 2-5 deal with the chemistry of the paraffins, and Chapters 6-10 with the manufacture of olefins and the chemical developments based on them. The manufacture of the other important classes of hydrocarbons—diolefins, naphthenes, aromatics, and acetylene—are discussed in Chapters 11-14.

In Chapters 15-19, the manufacture and reactions of the principal petroleum chemicals are considered. Chapter 20 gives a brief summary of the chemical by-products —usually non-hydrocarbon—arising from refinery operations.

There are appendices containing useful statistics relating to world petroleum production and consumption and the manufacture of synthetic organic chemicals of non-coal tar origin in the U.S.A.

The book is well printed and has ample diagrams to illustrate the manufacture of the more important chemicals. There is a very full subject index.

For the student, research worker, and for the many people in the petroleum chemicals industry, this book will fill a great need.—R.C.

Book Received

THE CHEMISTRY OF THE ACETYLENIC COMPOUNDS. Vol. 2. The Acetylenic Acids. A. W. Johnson. 1950, London: Edward Arnold & Co. Pp. xxvii+328. 50s.

· HOME ·

Lead Price Raised

An increase in the price of good soft pig lead by £8 from £104 to £112 a ton delivered, was announced by the Ministry of Supply on Tuesday, August 22.

Examination Successes

The Pharmaceutical Society announces that 86 men and 47 women passed its intermediate examination held in Scotland in July.

Coal Production

Britain's output of both deep-mined and opencast coal last week was lower than in the corresponding week last year. Comparing figures are: Last week: 3,958,500 tons (deep-mined 3,699,200 tons, opencast 259,300 tons); August 20, 1949: 4,010,000 tons (deep-mined 3,748,300 tons, opencast 261,700 tons).

Chadwick Public Lectures

The Chadwick trustees announce the 38th annual series of public lectures, as follows: September 21, St. Mary's Hospital Medical School, London; October 3, Art Gallery, Plymouth; October 24, Westminster Hospital Medical School, London; November 14, Royal Sanitary Institute, London; December 5, Royal Society of Tropical Medicine and Hygiene, London.

British Platinum for U.S.A.

A shipment of 34,000 troy ounces of plantinum from British Government stocks for the American raw material reserves has arrived in the U.S.A. The sale was negotiated under the Economic Co-operation Administration agreement between the U.K. and the U.S.A. This provides that 5 per cent of the British counterpart fund must be set aside for ECA administrative purposes and for the purchase of scarce raw materials.

Dearer Copper

The price of electrolytic copper was raised on August 22 from £186 to £202 a ton delivered consumers' works. Buying price for rough copper in slabs of from 2 to 3 cwt. was also raised from £144 to £156 a ton, discounts, premiums, and charges for forward delivery remained unchanged. The increases were made to safeguard the position of the Ministry of Supply in view of the rise in copper prices made by U.S. producers and pending discussion with the Northern Rhodesian producers under an agreement made with them last July.

K.I.D. Exemptions

The following items have been exempted from Key Industry Duty for the period beginning August 24 and ending December 31, 1950: Disodium dihydrogen pyrophosphate (a sodium phosphate), heptoic acid, pyrocatechol, succinonitrile. The order is the Safeguarding of Industries (Exemption (No. 9)) Order, 1950, and is published as Statutory Instruments 1950, No. 1389.

Revised Belting Standard

The British Standards Institution announces a revision of the war emergency standard B.S. 351, relating to friction surface rubber transmission belting, which it has just issued (2s. post paid). The document provides four fabric weights for use in the construction of belting, and gives full constructional details and test requirements. It incorporates appendices dealing with service conditions.

Spreading Fertiliser from the Air

The first full-scale top dressing of hill and marginal land by an aeroplane equipped with a six-ton hopper is expected to take place in the Plynlimon highlands, Cardiganshire, at the end of this month. The 'plane will make eight flights in two days scattering nearly 50 tons of lime and phosphate dressing. The Minister of Agriculture (Mr. Tom Williams) and representatives of the Colonial Governments are expected to witness the demonstration.

U.K. Light Metal Statistics

Ministry of Supply Statistics relating to U.K. production, imports and consumption of light metals in June include the following (in long tons):—Virgin aluminium: production 2455, imports 18,343. Secondary aluminium: production 6918. Aluminium scrap arisings 7248, consumption 10,222. Aluminium fabrication 19,073, foil 1004. Magnesium fabrication 319. Production and imports of virgin aluminium were both less than a year ago.

Refinery Column's Tunnel Trip

Special traffic arrangements were put into operation in the Mersey tunnel recently to enable a huge tubular column driven by two tractors to pass through on its way to the new Shell Mex oil refinery at Stanlow where it is to be installed as a refiner. Measuring 95 ft. by 8½ ft. and weighing 50 tons, the column took up the two lanes normally used for traffic to Birkenhead.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ANGLO-DUTCH PETROLEUM CO. (WESTERN), LTD. London, E.C. (M., 26/8/50). July 21, £5000 mortgage, to Credit for Industry, Ltd.; charged on property known as Regent Garage & Filling Station, 409 Prince Regent Lane, Plaistow. *Nil. October 5, 1949.

BATTERY CONSTRUCTION, LTD., Bridgwater. (M., 26/8/50.) July 21, £6000 debenture to N. Pensabene-Perez, Nassau, Bahamas; general charge. *Nil. December 8, 1949.

CLAY & SON, LTD., London, E., fertiliser manufacturers. (M., 26/8/50.) July 12, mortgage and a deed both securing £2010 and further sums not ex. therewith £40,000, to Westbourne Park Building Society; charged on land and factory at Marshgate Lane, West Ham. *£6000. October 15, 1947.

CRAYONNE, LTD., Bexley, manufacturers of plastic and moulding materials. (M., 26/8/50.) July 20, mortgage, to Martins Bank, Ltd., securing all moneys due or to become due to the bank; charged on property known as St. Bernard Works, Bexley, with plant, machinery, etc. *Nil. April 6, 1950.

WENLOCK LIME CO., LTD., Birmingham. (M., 26/8/50.) July 21, £3600, £4500, £4050, £4050, £4500, £4500, £4500 and £4500 mortgages, to Dudley & District Benefit Building Society; charged on properties. *Nil. December 31, 1947.

Satisfactions

HADDON CONCRETE CO., LTD., Nottingham. (M.S., 26/8/50.) Satisfaction July 26, of charge registered August 15, 1949.

MURRAY & MCCONACHIE, LTD., Winchester, chemists. (M.S., 26/8/50.) Satisfaction July 24, of charge registered August 25, 1947.

WILLIAM TOLSON, LTD., Fazeley, bleachers, dyers, etc. (M.S., 26/8/50.) Satisfaction July 24, of series of debentures outstanding July 1, 1908.

Company News

E. Griffiths Hughes, Ltd.

Consolidated profits of E. Griffiths Hughes, Ltd., and its subsidiaries, for the year ended March 31, amounted to £390,297, from which the directors recommend a final dividend of 7½ per cent should be paid on the ordinary shares, making **10 per cent for the year.**

London Aluminium Co., Ltd.

The London Aluminium Co., Ltd., announces that there will be no interim dividend for 1950 on the ordinary shares. For 1949 the payment was 30 per cent. The directors state that the company has traded at a satisfactory profit for the year but that cash resources should be conserved. Its long-term policy will be to build up substantial reserves associated with the expansion of the engineering side of its activities. Orders on hand are stated to be sufficient for the firm's production capacity for some months ahead.

Triplex Safety Glass Co., Ltd.

The Triplex Safety Glass Co., Ltd., is raising its dividend by 2½ per cent by paying 1s. 3d. per 10s. unit, or 12½ per cent less tax, for the year ended June 30. This compares with 1s. per unit for each of the three preceding years. Gross group profits totalled £186,306, against the previous year's £143,786.

Increase of Capital

An extraordinary general meeting of Albright & Wilson, Ltd., will be convened shortly at which stockholders will be invited to approve an increase in the authorised capital of the company. Subject to such approval and the consent of the Treasury it is the board's intention to make an issue of 2,023,164 five per cent cumulative preference shares of £1 each at 20s. per share and to offer the same for subscription to the holders of ordinary stock by means of renounceable letters of rights in the ratio of one preference share for every two ordinary stock units of 5s. each held on an appointed date. Further particulars will be announced in due course.

Chemical and Allied Stocks and Shares

GILT-EDGED stocks resumed their advance this week and 3½ per cent War Loan at over 95 reached its highest level this year. The better news from Korea helped market sentiment generally, although there was no marked improvement in the volume of business. Talk of a big new Government issue to finance rearmament is now regarded as probable in due course. Meanwhile, British Funds are attracting attention as the best safety-first holding until the general investment outlook can be better clarified. Leading industrial shares have strengthened a little, taking their tendency from that in gilt-edged stocks, although movements generally were small and have not exceeded more than a few pence.

Chemical and allied shares were generally better where changed, partly because of more general recognition in the City of the important part the industry will play in the rearmament programme. Imperial Chemical have risen sharply to 43s. 3d. Monsanto kept steady at 49s., Fisons at 26s. 6d., and Albright & Wilson, at 30s. 6d., were steady, following news of the company's plans to raise £2 million by a rights issue of 5 per cent preference at par to shareholders. Boake Roberts kept at 29s. 9d. In his annual statement, Mr. E. J. Boake tells shareholders that plans to capitalise part of the reserve fund are for the time being frustrated by the ban on free share issues of ordinary shares.

Brotherton 10s. shares eased, but later strengthened to 19s. 10½d. Amber Chemical 2s. shares were 3s., F. W. Berk 2s. 6d. shares 10s. 3d., Bowman Chemical 4s. shares 5s. 3d., Pest Control 5s. shares 6s. 9d., Laporte Chemicals 5s. units 10s. 1½d., and Lawes Chemical 10s. 3d. British Chemical & Biologicals 4 per cent preference were 17s. 3d., W. J. Bush ordinary 81s. 3d., and L. B. Holliday 4½ per cent preference 19s. 6d.; Woolley 4¾ per cent debentures kept at 104½.

Reflecting the better tendency on the Stock Exchange, British Aluminium firmed up to 41s., Birmid Industries advanced to 85s. and British Glues & Chemicals 4s. shares further strengthened to 25s. Triplex Glass, however, despite good results and higher dividend, came in for profit-taking and the 10s. units, after touching 24s. 9d., reacted to 23s. 6d. United Glass Bottle kept firm at 75s.

Borax Consolidated were 54s. 3d., British Oxygen 95s. 3d., and United Molasses improved to 42s. 9d.; the 4s. units of the Distillers Co. were up to 19s. in anticipation of the full report and accounts. Turner & Newall also moved better at 80s. 3d., Associated Cement improved to 84s. 6d., and paint shares recorded moderate gains. Pinchin Johnson at 39s. 6d. were good on the full results and the chairman's statement that the company is likely in due course to segregate its overseas assets.

Boots Drug rose further to 48s. 9d. and Glaxo Laboratories were close on 47s. Levers, after easing, firmed up to 39s., and there were small gains in shares of companies connected with plastics. British Xylonite were 73s. 9d., and British Industrial Plastics 2s. shares 5s. 4½d. De La Rue strengthened to 25s. 3d. on the full results; the chairman indicates in his statement that later on more capital will be required, partly because of preparations in hand to repay the bank overdraft. Oils have been steadier with Shell at 62s. 6d. and Burmah Oil 55s.

Scottish Chemists' Withdrawal

AT a private meeting last week chemists in Edinburgh, the Lothians, and Peebles, authorised the Pharmaceutical Standing Committee (Scotland) to withdraw their services from the National Health Service. The resolution will be placed before a meeting of the Scottish Pharmaceutical General Council in Edinburgh on August 30. The meeting followed the introduction of regulations by the Secretary of State for Scotland giving him power to alter chemists' rates of payment under the service.

Technical Publications

ANODES for the plating trade are the subject of a 12-page booklet recently issued by the Federated Metals Division of the American Smelting and Refining Co., New York. Regular anode products of the division include those of chill-formed and electrodeposited copper, also anodes of lead, zinc, tin, brass and cadmium.

* * *

FIRST production of polystyrene in the United Kingdom (THE CHEMICAL AGE, 63, 81) at its Newport factory is described in "The Autoclave" (Vol. 2, No. 4), house magazine of Monsanto Chemicals, Ltd. With this issue the journal completes its first year of publication.

Prices of British Chemical Products

Supply Position Satisfactory

THE market for industrial chemicals continues to show a greater activity than is usual for the period, the present movement being mainly due to the desire on the part of consumers, under the present uncertain conditions, to cover their forward requirements. Despite the overall increased demand, there has been no evidence of a tight position in any section of the market and, in fact, the supply position appears to be comfortable. So far as prices are concerned, the tendency is towards higher levels and the upward movement in the quotations for non-ferrous metals has necessitated adjustments in the quotations for the chemical compounds. White lead and red lead, which were increased a week ago to £131 10s. per ton and £122 10s. per ton respectively, have been further advanced, at the time these notes were written, to a basis price of £138 10s. per ton for white lead and a basis price of £130 per ton for red lead. The demand for coal tar products has remained brisk and shipments of tar acids to the U.S.A. have been satisfactory. There have been no price changes reported, but the undertone is very firm.

MANCHESTER.—A firm tone has continued in virtually all sections of the Manchester market for heavy chemical products during the past week. The demand for soda ash and other alkalis on home consumption account has been on steady lines and good deliveries are being taken of these, as well as of a wide range of other products. On the export side, a fair number of new inquiries has been dealt with. Moderate buying interest has been reported in the fertiliser materials. In the market for tar products reasonably steady trading conditions has been experienced in most sections, especially in the light distillates.

GLASGOW.—There has been considerable activity in the Scottish market owing to the fact that there is a tendency for certain heavy chemicals to become scarce, no doubt influenced by the international situation. The export market remains fairly steady.

Price Changes

Rises: Ammonium bicarbonate, ammonium sulphate, compound fertiliser, "nitro-chalk", red lead, white lead, litharge.

Reduction: Bleaching powder.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £61; 80% pure, 1 ton, £66; commercial glacial 1 ton £71; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £110 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over, £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 1d. per proof gallon; 5000 gal. lots, d/d, 2s. 2½d. per proof gal.

Alcohol, Diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £47 per ton.

Ammonium Carbonate.—1 ton lots: MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £171 10s. per ton.

Antimony Oxide.—£160 per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4½d. per lb. Crimson, 2s. 6½d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £38 5s. to £41 5s., ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £27 5s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £29 10s. per ton d/d; 2-ton lots, £29 15s. per ton.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £54; in 1-cwt. bags, commercial, granular, £34 10s.; crystal, £37; powder, £38, extra fine powder, £39; B.P., granular, £44; crystal, £46; powder, £48-£48 10s.; extra fine powder £48.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £62; crystal, £69; powder, £66 10s.; extra fine powder, £68 10s.; B.P., granular, £75 10s.; crystal, £81; powder, £78 10s.; extra fine powder, £80 10s.

Butyl Acetate BSS.—£144 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£135 10s. per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 9s. 10d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 9d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 11½d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 10d. per lb.

Copper Sulphate.—£52 15s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 2s. per 10 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £103 10s. per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1260 s.g. 128s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 18s. per lb. in cwt. lots.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale tech., £85 per ton; dark tech., £75 per ton ex works; barrels returnable.

Lead Acetate.—Nominal.

Lead Carbonate.—Nominal.

Lead Nitrate.—Nominal.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £122 10s.; orange lead, £134 10s. Ground in oil: red, £144 5s.; orange, £156 5s.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £131 10s. per ton. Ground in oil, English, under 2 tons, £150.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d. £22 to £25 per ton.

Litharge.—£122 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 7s. 4d.; smaller quantities dearer

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 7½d. per gal.; pyridinised 64° O.P. 100 gal., 3s. 8¼d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1 ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £63 10s. per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1½d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9⅝d. per lb.; ground, 10⅝d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 11s. 1d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £6 13s. to £7 13s. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s per ton; medium, £67 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER: 2s. to 3s. 4½d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £29 12s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite. — Pea crystals £23 2s. 6d. a ton; commercial, 1-ton lots, £21 12s. 6d. per ton carriage paid.

Sodium Iodide.—B.P., 16s. 9d. per lb, in cwt. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £101 10s. ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 17s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £32 10s., anhydrous, £65; tri-sodium, crystalline, £32 10s., anhydrous, £64.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £25 15s. per ton, d/d, in drums; broken, £27 5s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £15 11s. 6d. to £17 16s. 6d. according to fineness.

Sulphuric Acid.—160° Tw., £6 16s. to £7 16s. per ton; 140° Tw., arsenic free £5 10s. per ton; 140° Tw., arsenious, £5 2s. 6d. per ton; Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £8 5s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £121 10s.; green seal, £120 10s.; red seal, £119.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £11-£11 10s. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£59 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5¾d. per lb.; dark, 10¼d. to 1s. per lb.

Lithopone.—30%, £36 15s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £12 8s.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade. where available, £10 17s. I.C.I. Special No. 1, £19 9s. National No. 2, £11 0s. 6d. per ton

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £19 17s. 6d. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works: 90's, 3s. 3d.; pure, 3s. 5¼d.; nitration grade, 3s. 7½d.

Carbolic Acid.—Crystals, 10¾d. to 1s. 0½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 11¾d. to 1s. 1½d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6¼d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6¼d. to 9¾d. per gal.

Cresylic Acid.—Pale 98%, 3s. 3d. per gal.; 99.5/100%, 3s. 11d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 3s. 11d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £9 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 90s. per ton f.o.r. suppliers' works; export trade, 110s. per ton f.o.b. suppliers' port. MANCHESTER: £5 10s. f.o.r.

Pyridine.—90/160°, 22s. 6d. MANCHESTER: 20s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal. MANCHESTER: Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 4s. 0½d. to 4s. 3d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: August 22. The prices of all refined oils and fats remain unchanged during the eight-week period ending October 7. The prices of all unrefined oils and fats remain unchanged during the four-week period ending on September 2.

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Process for the preparation of prolonged effect insulin products.—Nordisk Insulinlaboratorium. Dec. 20 1945. 643,268.

Apparatus for charging fibrous material into a digester.—Kamyr A/B, and J. C. F. C. Richter. Dec. 28 1945. 643,201.

Apparatus for heating and controlling the temperature in a continuously operated digester.—H. G. C. Fairweather. (Kamyr A/B). Dec. 28 1945. 643,269.

Central refrigerating plant.—Permans Patenter A/B, and P. E. Perman. May 3 1946. 643,207.

Production of vitamin preparations, and their related by-products.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Aug. 9 1946. 643,009.

Methods of sizing textile yarns.—Monsanto Chemical Co. Nov. 8 1946. 643,273.

Tri-and tetrasubstituted biguanides and method of preparing same.—American Cyanamid Co. Nov. 20 1946. 643,012.

Retorts for sterilising by heating and subsequent cooling of food in closed receptacles.—K. Omsted. Dec. 13 1946. 643,276.

Combustion apparatus.—Babcock & Wilcox, Ltd., and C. H. Sparks. Jan. 14 1948. 643,279.

Methods and apparatus for reactivating bonechar.—Refined Syrups & Sugars, Inc. Feb. 28 1947. 643,282.

Polymerisation of organo-siloxanes.—Corning Glass Works. March 3 1947. 643,018.

Apparatus for making soda water.—Z. Kaszab. March 27 1947. 643,020.

Gas filter cleaning devices.—Svenska Flaktfabriken A/B. April 3 1947. 643,021.

Lubricating protective oils having anticorrosive properties.—C. C. Wakefield & Co., Ltd., E. A. Evans, J. S. Elliott, J. Arnold, and P. W. L. Gossling. March 31 1948. 643,025.

Preparation of a nodulated support for a catalyst.—Gas Light & Coke Co., R. H. Griffith, J. H. G. Plant. June 1 1948. 643,159.

Methods of forming selenium rectifiers.—British Thomson-Houston Co., Ltd. July 29 1947. 643,165.

High boiling esters of unsaturated aliphatic alcohols and process of preparing same.—American Cyanamid Co. Aug. 5 1947. 643,033.

Corrosion-preventive compositions.—N.V. De Bataafsche Petroleum Maatschappij. Aug. 5 1947. 643,034.

Manufacture of co-polymers.—J. Downing, and J. G. N. Drewitt. Aug. 6 1948. 643,169.

Glass forming apparatus.—Sylvania Electric Products, Inc. Aug. 6 1947. 643,080.

Hardness testers.—W. A. Williams. Aug. 21 1947. 643,286.

Processes for the treatment of hydrocarbon oils.—V. Weinburg. Sept. 4 1948. 643,287.

Method of and apparatus for storing and dispensing liquified gases.—J. G. Gaunt. (Linde Air Products Co.). Sept. 22 1947. 643,035.

Infra-red analysing apparatus.—C. A. Parsons & Co., Ltd., and A. E. Martin. Sept. 29 1948. 643,086.

Electric accumulator batteries.—H. O. Gazda, and L. Viecelli. Oct. 14 1947. 643,087.

Preparation of 2 : 6-Dihalogeno diphenyl ethers.—Glaxo Laboratories, Ltd., E. T. Borrows, and J. C. Clayton. Oct. 5 1948. 643,089.

Hard metal pieces having inserts of a machinable metal or alloy of high melting point.—Murex, Ltd., and R. W. Rees. Nov. 10 1948. 643,039.

Preparation of mixed mercaptal acetals.—General Aniline & Film Corporation. Dec. 8 1947. 643,041.

Method of producing diazotype images and diazotype materials therefor.—General Aniline Film Corporation. Dec. 9 1947. 643,042.

Apparatus for the preparation of carbon dioxide baths.—P. L. Derome. Dec. 15 1947. 643,044.

Polymerisation processes and the products obtained thereby.—Monsanto Chemical Co. Dec. 17 1947. 643,045.

Process for the preparation of hydroxyacylaminoazo dyestuffs.—Sandoz, Ltd. Dec. 18 1947. 643,046.

Microscopy.—F. H. Smith. Jan. 24 1949. 643,048.

Washbottle for laboratory and other use.—J. Polacek. Dec. 27 1947. 643,182.

Manufacture of iron-antimony alloys.—D. Primavesi. Dec. 29 1947. 643,049.

Process and device for cooling powder yielded by the pulverisation drying process.—Luwa AG, and C. Andermatt. Dec. 30 1947. 643,184.

Electrical devices having vitreos envelopes with electrodes therein.—Westinghouse Electric International Co. Jan. 6 1948. 643,052.

Conditioning of anthraquinone vat dyestuffs.—L. Berger & Sons, Ltd. Jan. 13 1948. 643,291.

Process for the preparation of dis- and poly-azo dyestuffs.—Sandoz, Ltd. Jan. 15 1948. 643,054.

Electrolysis of alkali metal salts.—I.C.I., Ltd. Jan. 19 1948. 643,098.

Optical observation and illuminating means for medical and technical purposes.—A. Burren-Glauser. Jan. 21 1948. 643,099.

Means for the suppression of explosions and the prevention or extinction of fires.—Graviner Manufacturing Co., Ltd., W. G. Glendinning, and A. M. MacLennan. Jan. 28 1949. 643,188.

Therapeutic substances.—J. F. Arens, D. A. Van Dorp, W. Bradley, and M. Gayler. Feb. 11 1949. 643,055.

Therapeutic substances.—J. F. Arens, D. A. Van Dorp, W. Bradley, and M. Gayler. Feb. 11 1949. 643,056.

Homogeneous flaked catalyst composition and its preparation.—Seymour Manufacturing Co. Feb. 17 1948. 643,109.

Lubricator.—C. A. Norgren Co. Feb. 24 1948. 643,058.

Diazotype photoprinting materials.—General Aniline & Film Corporation. March 15 1948. 643,063.

Eethyl cellulose hot-melt coatings.—Hercules Powder Co. March 31 1948. 643,064.

Artificial ageing and maturing of alcoholic liquors.—Alchemy, Ltd., and F. J. E. China. Feb. 10 1949. 643,068.

Method of preparing tris (trimethylsilyl) borate.—British Thomson-Houston Co., Ltd. May 6 1948. 643,298.

Preparation of prolonged effect insulin products.—Nordisk Insulinlaboratorium, and A. Abbey. Sept. 18 1947. 643,300.

Production of gamma-ferric oxide hydrate and gamma-ferric oxide.—Columbian Carbon Co. June 14 1948. 643,303.

Method of electrolytically forming silver chloride.—Burgess Battery Co. June 21 1948. 643,233.

Coating compositions.—Columbian Carbon Co. July 9 1948. 643,308.

Developer for the positive photographic diazotype-process.—L. Van Der Grinten Chemische Fabriek. July 9 1948. 643,309.

Co-polymerisation products.—J. Downing, and J. G. N. Drewitt. Jan. 5 1949. 643,198.

Process for the manufacture of higher alcohols.—N.V. De Bataafsche Petroleum Maatschappij, and H. F. Dammers. July 20 1948. 643,136.

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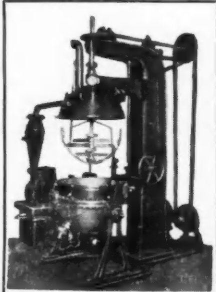

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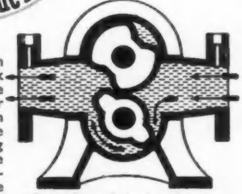

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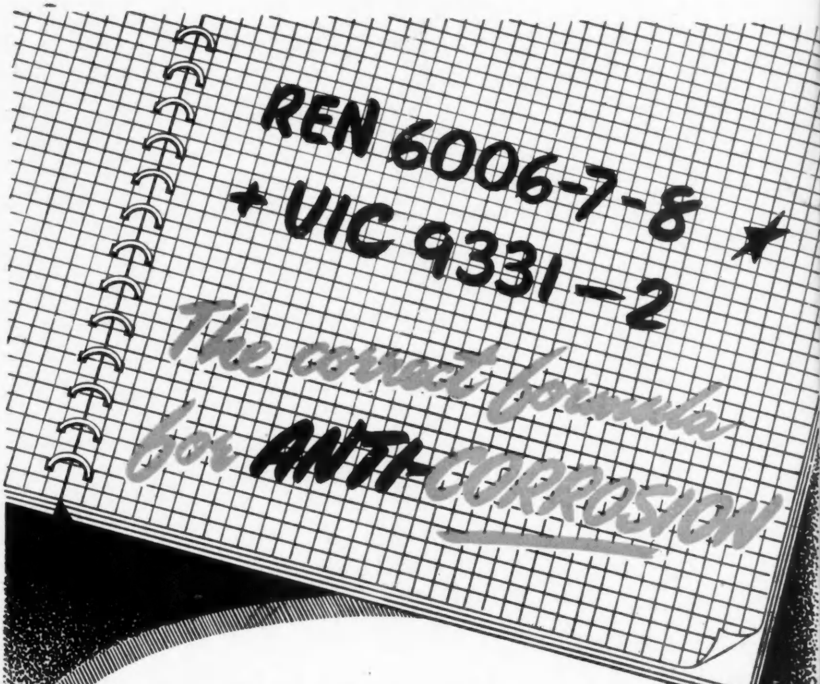

Printed in Great Britain by The Press at Coombelands, Ltd., Addlestone, and published by Benn Brothers Ltd., at Bouverie House, 154, Fleet Street, E.C.4, 26 August 1950. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.

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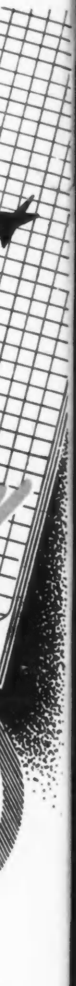

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